

# Heartland of Cities

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# Heartland of Cities

*Surveys of Ancient Settlement and Land Use  
on the Central Floodplain  
of the Euphrates*

Robert McC. Adams

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*To the Memory of Fuad Safar*



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# Foreword

This century has seen great discoveries in the field of ancient Mesopotamian archaeology. The royal tombs of Ur with their gold treasure come immediately to mind, and many other spectacular finds run a close second. With time, though, the less sensational surveys by Robert McC. Adams that form the basis of this book will be seen, it seems safe to predict, to equal or perhaps even surpass them in fundamental importance; for they give us for the first time the original geographic setting within which the ancient Mesopotamian history evolved, trace the ancient watercourses on which all communication moved and along which all settlement ranged itself, and show that their courses were totally different from those of present-day rivers and canals. They likewise throw light on the rise of the earliest cities in human history; and their data, bearing on the shifting density of population through the millennia, raise questions and suggest answers about the basic factors that shaped the country's fortunes—the determinants for major trends of its history.

The achievement the surveys represent has not been attained easily; the demanding treks through uncharted deserts in burning sun, in rain, or in dust storms demanded devotion, physical stamina, and persistence in no common degree. To this add the pressure of other demanding duties and the wearisome, constant difficulties of obtaining permission to work owing to shifting political orientations and military considerations. That Adams did succeed in surveying almost all of the alluvium is a tribute to sheer single-mindedness and unflagging perseverance. It is also a stroke of great luck for ancient studies, for the expanding of cultivation into former desert areas—commendable as that is in itself—is rapidly making archaeological reconnaissance of this type impossible.

The fieldwork on which this study is most immediately based was undertaken by Adams between November

1968 and December 1975. It continues and completes his earlier survey work, such as the survey of ancient Akkad undertaken with Vaughn Crawford in 1956/57 and his survey of the Diyala region undertaken as part of the Diyala Basin Archaeological Project in 1957/58. Drawing on this earlier work and supplemented by a survey of the region around Ur by Henry T. Wright, this volume thus covers almost all of the area of ancient Babylonia or, in earlier terms, of Sumer and Akkad. Only the Lagash area in the southeast now waits for coverage with the techniques Adams has developed.

When Adams began work in 1956, the method of ceramic surface survey was still very new. Two pioneering surveys had been undertaken, which had convincingly demonstrated the potential of the survey method as a means of recovering the river and canal network of successive periods, and therewith their settlement patterns. But, partial and incomplete as they were, they urgently called for large-scale, systematic coverage of the country as a whole. The basic technique then used was collecting and dating the surface sherds on the ancient sites of a region, then plotting the dated sites on period maps. Interpretation proceeded from the premise that in a semiarid country like ancient Mesopotamia settlement would have been possible only where water was available—along rivers and canals. Where the settlements of a period showed linear patterns, it could be assumed that the lines reflected the watercourses upon which the settlements depended. Further information offered by the data included the delineation of settled areas in a region as contrasted with swamps or desert wilderness, and evidence of occasional wholesale abandonment of once inhabited tracts. Sizes of the sites visited were recorded, but mainly with a view to identifying the larger ones with cities known from textual evidence.

Adams developed and refined these techniques sig-

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nificantly by using aerial photographs, which often show in great detail the actual shifting courses of ancient canals that could be dated, but only approximately located, by data from the ground survey. He also tightened the coverage in the search for ancient sites to a narrow grid so that he might not miss even the faintest traces of occupancy, "pot drops," in the area under investigation. In interpretation, he shifted emphasis to data on the size of the sites studied. He is fascinated by the contrast between city and country and so has become keenly aware that survey data may well miss out on very important factors in the population picture: the nomadic herders and their semisettled brothers, not necessarily groups to be considered aliens and enemies of the settled population. A further aspect of the city-country contrast has his attention: movement into the city of people from surrounding villages, either because of the promise of economic betterment or because the village, in times of war or unrestricted banditry, was too vulnerable, so that its inhabitants had to seek safety behind the walls of a fortified major city. Conversely, in times of relative peace and internal order, the trend would reverse itself and people would move from the city into the country to be near the fields on which the city relied for its living.

In developing his own method, Adams has kept abreast of recent methodological thinking. And in exploring the possibilities of deriving the maximum of significant information from the data provided by an archaeological survey he shows a refreshing and most timely caution. Over and over he weighs proposed new methods of interpretation to see what the evidence will actually sustain and warns against assuming for it a degree of precision that, by the nature of the case, it cannot have. Uncertainty about how completely smaller sites have been noted and recorded, even in the most careful survey, makes him hesitant to apply analytical approaches such as "central place theory" and Thyssen's polygon technique. He also judiciously rejects recent redefinitions of the term "state" that jettison its sociolegal core—"monopoly of violence"—in order willy-nilly to make it recognizable in terms of potsherds gathered. Thus the book offers an instructive critique of method by a veteran in the field.

Most basically, perhaps, village and city—their origins and ends—present themselves to Adams as primary questions. And so the basic theme of his study is an extensive, detailed, and incisive inquiry into "the forces responsible for precocious early growth and those that later contributed to catastrophic decline and outright abandonment" of these forms.

Overall, Adams's data show from the beginning of settlement down to medieval times a curve with three distinct peaks of population density separated by lows: the Late Uruk period, the Ur III period, and the Neo-Babylonian and Parthian periods. As reason for these fluctuations Adams proposes the inherent vulnerability

of irrigation agriculture, with its dependence—the more so the more extensive it is—on a stable centralized administration. Stability, he suggests, demands a more varied economic basis, for example, one that would allow an alternative when for one reason or other agriculture faltered. This, of course, implies that the country could then support a smaller population than it could with exclusive reliance on intensive irrigation agriculture. In developing this thesis Adams takes the reader on a fascinating journey through time that, without slighting the particulars of history, yet keeps the focus steady on the general forces behind history, shaping it. He speaks as an anthropologist.

And yet there is no lack of insights and problems to engage and challenge the philologist and the historian. Adams's argument that the earliest cities of the Ubaid and Uruk periods, such as Eridu and Uruk, with their astoundingly elaborate and monumental architecture, are best understood economically as "central places"—that is, as centers for pilgrimage to religious festivals and for exchange of goods, and so drawing support widely from both settled and nomadic populations—fits remarkably well with the apparent meaning of many of the oldest city names. They suggest terms for tribal storehouses of nomadic or seminomadic groups in which the tribe's valuables, especially its religious emblems, were kept. Again, the "heroic age" in Sumer—Early Dynastic—was, like heroic ages anywhere, a period of unchecked raiding and feuding. Thus its character is strikingly confirmed by Adams's findings that outlying villages were abandoned wholesale at that time, with people seeking safety behind city walls, so that the large cities grew larger. For the Akkade period there are some curious findings. The villages become repopulated, most likely because of internal controls by means of a chain of police posts meant to guard the safety of the major trade routes. Yet in the south many larger cities dwindle or are abandoned outright. Here, perhaps, historical causes are responsible. Umma, for instance, dwindled in area from more than 400 hectares to somewhere between 200 and 40 hectares, while the substantial city of Umm-el-Aqarib to the south of it—possibly ancient Ki-dingir—was totally abandoned. Here one remembers that Rimush of Akkade boasts that in battle with Umma and Ki-dingir he laid low 8,900 men, took 3,000 men captive, and led out 3,000 men to be massacred. A loss such as this—some 12,500 workers—may go some way toward explaining the cities' decline, for it clearly would have seriously affected their ability to keep up the extensive irrigation works on which they depended, as well as to carry on general agricultural work. And so one could go on. The political and economic dominance of Isin and of Larsa in the period called after them is strikingly reflected in the contemporary extensive canal works around them, and for period after period the survey data enrich or change our traditional picture.

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Surprisingly, at the time of the Islamic conquest the survey data show extensive destruction of populous settlements that is quite unexpected since it was passed over in silence by the written historical tradition.

To sum up: A great and lasting achievement with a wealth of new insights awaits the reader.

Thorkild Jacobsen



# Preface

Much of the central floodplain of the ancient Euphrates now lies beyond the frontiers of cultivation, a region of empty desolation. Tangled dunes, long disused canal levees, and the rubble-strewn mounds of former settlements contribute only low, featureless relief. Vegetation is sparse, and in many areas it is almost wholly absent. Rough, wind-eroded land surfaces and periodically flooded depressions form an irregular patchwork in all directions, discouraging any but the most committed traveler. To suggest the immediate impact of human life there is only a rare tent, its mirage floating just over the horizon; the occasional ruined scarps of mud-walled tribal watchtowers dating back a century or more; sometimes a small knot of women collecting dead scrub for firewood; and at long intervals a distant file of camels or a scattering of sheep and goats with their young herdsman. The bustling commercial towns of modern Iraq lie out of reckoning, hugging the modern river courses and their major effluent canals. Towns today, as always, are concealed as one approaches them on the ground by dense surrounding belts of palm groves. But sometimes, from a high dune on still, early mornings, one can detect them even from the remote desert as faint, spiky clusterings of electric transmission pylons, brick factory chimneys, and water towers. Just so wayfarers once must have taken their bearings on the turreted walls and zig-gurats of much more ancient urban centers.

Students whose interests are confined to the modern Middle East, and in fact most modern Iraqis, have little reason to venture into this parched wilderness. Even the tribally organized, seminomadic groups that fought over it until the time of the First World War, both with each other and with tax-collecting, punitive expeditions sent out by the Ottoman authorities, have mostly settled in better-watered adjacent areas. Yet at one time here lay the core, the heartland, of the oldest urban, literate

civilization in the world. Both sides of this yawning contrast equally demand explanation: the forces responsible for precocious early growth, and those that later contributed to catastrophic decline and outright abandonment.

Nothing quite so ambitious, or foolhardy, as a comprehensive explanation can yet be offered for either the rising or the falling portion of the curve. To a degree not widely enough understood, the study of the immensely long and rich past of Mesopotamia is still in a relatively early state of development. Campaigns of excavation, although some of them are justly famous, have been almost entirely limited to a handful of the major cities of antiquity. In nearly all of those, only a minute portion of the associated debris has yet been sampled, even though many years and work crews frequently numbering in the hundreds have been devoted to the effort. Many thousands of other sites are now known from archaeological reconnaissance like that which furnishes the primary empirical basis for this study. Most are much smaller, and it is especially the fully rural as well as moderate-sized communities that are grossly underrepresented in what we know at present. In other words, both archaeological and archival sources for the most part provide little more than narrow beams of light with which somehow we seek to illuminate an immense dark room. To speak of general explanation in anything other than a very loose, informal sense when even the most prominent, enduring contours within that room remain so indistinct and subject to dispute would be to misapply the basic precepts of the search for historical causality.

This study is concerned with certain major features of the infrastructure of Mesopotamian civilization, principally its patterns of agricultural land use and the hierarchical array of communities in which people lived. The larger cycles of growth and decline that were mentioned

earlier are perhaps best mirrored in these features, whether or not the same features supplied the principal energizing forces that produced the cycles. Land use and settlement have always involved the livelihood and geographic clustering or dispersal of virtually the whole population. By plotting changes in these variables through time, we can at least hope to arrive at a few aggregative indexes of economic well-being—far cruder, but also with a far deeper time perspective than those toward which large-scale statistical compilations of social and economic indicators are now directed. My intent is to trace what is known of the changing character of this infrastructure over a span approaching six millennia from a wide, necessarily somewhat eclectic range of published textual and archaeological sources as well as from the findings of archaeological surface reconnaissance.

Fifteen years ago, while working in his characteristically incisive fashion over the manuscript of an earlier study along similar lines, Benno Landsberger was impatient for work to be directed at the region that finally is reported on here. The lower plains of the Diyala were marginal and hence unrepresentative, he maintained, and the discussion of settlement patterns on them had the defect of seeking “to define a dialect before the paradigm of the heartland is known.” He was probably right about what would have been the optimal order of precedence in fieldwork, though considerations other than archaeological preference frequently were the determining ones. We now know that the northern Tigris-Euphrates alluvium and its Diyala counterpart later came to overshadow central and southern Babylonia, but until late in the first millennium B.C. there was nothing in the north that remotely approached the interwoven continuity and massed demographic strength of the cities of the south. While doubtless of interest in its own right, the Diyala region was, as Landsberger saw, unrepresentative of the primary processes by which urban civilization first came into existence.

My reply to Landsberger at the time conceded less than this: “What is important . . . is not the degree of deviation of this or any other region from some undefined ‘norm’ but the encouragement of the study of general historical trends in the differing regional contexts in which they were manifest” (Adams 1965, p. ix). Perhaps I was less confident than he that his implicit distinction between a “key” area and neighboring marginal or dependent ones (Palerm and Wolf 1957, p. 29) would find such strong support in settlement pattern data when an opportunity finally came to survey his heartland. But perhaps also I was hesitant even then about circumscribing creative processes within sharply defined but somewhat arbitrary boundaries. To identify the zone of the greatest, longest-lived cities as the key, after all, was in a way only to restate the preoccupation of most Assyriologists with cities. In meeting the day-to-day demands of field recon-

naissance in the desert and taking the academic stance of an anthropologist, it was natural that my concerns focused primarily on agricultural infrastructures in the countryside.

Since that rather metaphorical exchange, much has happened to highlight certain distortions or anachronistic elements in both positions. In his case, one consequence of the further development of ecologically oriented studies has been to undermine his assumption that patterns of settlement and land use could be analogized to a linguistic paradigm. In most respects other than vocabulary, languages apparently can be considered closed systems. Dynamics of change within the realm of language alone account fairly satisfactorily for the great bulk of observed changes in linguistic structure and usage. Modes of subsistence and settlement, on the other hand, seem more and more clearly to be open, externally determined systems. They are products of shifting, converging social and natural circumstances rather than outgrowths of possibilities inherent in earlier arrangements displaying an unfolding internal momentum of their own.

Similarly in my own case, recent years have witnessed what might be called an explosion in the relative importance of regions formerly disregarded (by specialists in the great river valley civilizations of the Fertile Crescent) as largely peripheral. I then accepted the geographical framework of the Mesopotamian alluvium as a “natural” boundary within which to describe all the crucial processes associated with the growth of a civilization, and to expect ultimately to find explanations for them. Perhaps the most significant progress that has been made over the past two decades or so has consisted in tracing complementary developments in vastly different as well as distant regions: up the Euphrates into Syria and Anatolia, far out on the Iranian plateau, and even down the Gulf toward partners in maritime trade possibly as remote as the Indus Valley. What seems increasingly clear, in other words, is that my reliance on bounded regions as units of analysis differed from Landsberger’s only in being slightly more encompassing. This was then, and increasingly becomes, an unnecessarily limited approach. Comprehensive explanations, when and if we ever reach them, will still involve important factors around which it has been possible and convenient to draw boundaries. But they will also involve other factors that can be understood only within an indefinitely widening series of interactional contexts.

Archaeological reconnaissance, or at least this variant of it, is a very small-scale undertaking. Collaborators in other disciplines could have contributed much to the findings reported here, and I have had preliminary discussions of that possibility with a number of individuals with whom it would have been a pleasure to work. The decisive obstacle, in the end, has been that the scheduling of this type of fieldwork is bound to be somewhat erratic



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since official approval is less easily assured than in the case of excavations. As is detailed more fully in chapter 2, there were lengthy interruptions between its inception in November 1968 and its completion in December 1975. But, if the sole responsibility for the accuracy of the field data is therefore my own, my indebtedness to colleagues in many other respects is correspondingly greater.

Thanks are due, first, to the Directorate General of Antiquities both for its continuing official support and for informal acts of cooperation and kindness on the part of many of its officials. Dr. Behnam Abu-Soof, head of the Inspectorate of Surveys within the directorate, repeatedly provided valued counsel and assistance. Two members of his staff accompanied me for different periods in 1973 and 1975 as representatives of the directorate, Sabah Jassim al-Shukri and Abdul Qader al-Shaykhli. Riyadh al-Qayssi acted in a similar capacity during the initial season of reconnaissance in 1968 and Abdul Salaam Sim'an in December 1975. Their tactful handling of many official aspects of the undertaking and their unflagging cooperation in the fieldwork were much appreciated.

It is with a heavy burden of personal loss that I must also make a last acknowledgment of the special contributions of Fuad Safar, inspector general of excavations in the directorate. His support for, and seminal contributions to, programs of research aimed at understanding the historical geography of Mesopotamia probably have been decisive in whatever success they have had. Only those who had an opportunity to tap his encyclopedic knowledge, or to benefit from the subtlety and penetration he brought to bear upon the research problems of others, in spite of his own very burdensome official responsibilities, will fully appreciate the magnitude of the loss that Middle Eastern archaeology suffered with his untimely death in January 1978. The dedication of this book to his memory takes cognizance of the fact that without his contributions it would be substantially weaker and less complete and that without his encouragement it might never have been undertaken at all.

Within Iraq, other assistance to the project came from a number of sources. The British School of Archaeology, later the British Expedition to Iraq, hospitably provided a place for us to stay while in Baghdad, a useful library, and well-informed, congenial company. Thanks are owing to a succession of directors there—David Oates, Diana Kirkbride Helbaek, and J. Nicholas Postgate. Dr. Jürgen Schmidt, director of the Warka Expedition and the Baghdad Division of the German Archaeological Institute, made his Warka headquarters available as a field base for part of the work in 1975. While there, I was joined for several days of reconnaissance by one of his associates, Dr. Barbara Finster. Her well-informed views on Sasanian and Islamic archaeology have influenced the discussion of these periods in the appendix to chapter 5.

Dr. Douglas Kennedy, of the Centre Nationale de Recherche Scientifique, participated briefly in the 1968 reconnaissance that was based at the Oriental Institute's field headquarters at Nippur. It is likely that a much fuller, less elastically dated picture of the Hellenistic period would have emerged had we been able to continue joint work in 1969 as we then planned. Finally, the driver-mechanic for the project during the greater part of its existence was Jabbar Nasr Shoja. His willing and responsible aid under a variety of difficult conditions, and his exceptional familiarity with a wide region centering on the town of 'Afaq, were among the project's most useful field assets.

Several readers of an earlier draft have contributed much of their own specialized knowledge to the final form of the manuscript. They include two of my Oriental Institute colleagues, Professors John A. Brinkman and Ignace J. Gelb. It should also be said that all the faculty members housed on the third floor of the institute constitute an unparalleled resource in the field of Assyriology upon which I have drawn informally, repeatedly, and heavily. Professor Henry T. Wright, to whom I am further indebted for the account of his survey of the Ur region that forms an important appendix to this study, provided an exceptionally thoughtful and painstaking series of comments on the entire manuscript. Dr. Gregory A. Johnson not only read and extensively criticized chapter 3, but actively collaborated, in person for a time in July 1977 and by correspondence, in the analysis leading to its preparation. Treatment of the earlier periods dealt with in chapter 5 was revised on the basis of valuable suggestions made by Professor Joachim Oelsner and Dr. Matthew Stolper, and the numerous penetrating comments of Dr. Michael G. Morony (who also supplied some of the references to classical Islamic sources) occasioned several important modifications of the discussion of the later periods. The general conclusions to the study composing chapter 6 were written during a period of residence in the German Democratic Republic in November-December 1978, under an exchange agreement between the Akademie der Wissenschaften there and the United States National Academy of Sciences. To a considerable degree they were shaped by discussions with members of the staff of the Zentralinstitut für Alte Geschichte und Archäologie, and especially with Professor Horst Klengel. It should naturally be understood that none of these individuals is in any way accountable either for specific errors remaining in the final text or for the general approach it takes.

Another less specific, but no less important, set of influences on the form and content of this study are those that contributed to my earlier studies in a similar vein (Adams 1965, Adams and Nissen 1972). Prefatory acknowledgments made there apply here once again, therefore, for in spite of its broadened scope this volume will

## Preface

be recognized as consequent upon a trajectory that was generally set before the latest phases of field activity began. In this respect I should particularly like to express my indebtedness to Professors Thorkild Jacobsen and Hans J. Nissen. The first is responsible for having initiated systematic archaeological surface reconnaissance in Mesopotamia with pioneering insight as to its scholarly potential, and for having directly stimulated my own later work on the theme. To the second is owing an indefinable but substantial share of the many methodological and interpretive refinements that we hammered out together during the course of the Warka survey, improving the application of that insight without altering its fundamental character.

Valuable contributions of a somewhat more specialized nature have been made by a number of other scholars. Professor Karl W. Butzer helped correct several references to fluvial and geomorphic processes and in particular aided in the understanding of the ancient, meandering river channel north of Nippur that is described in chapter 3. Another colleague, Professor Richard L. Chambers, translated terms appearing on the redrawn Ottoman map in figure 5. Dr. Robert G. Hassert, of the staff of the University of Chicago Computation Center, designed the algorithm used in the land-use simulations shown in figures 21–23 and 35 and has provided a brief description of it in an appendix to chapter 3. Much of the basic viewpoint taken with regard to the locational analysis of ancient settlements in the same chapter stems from a discussion of the potentialities and limitations of my field data with Professor Brian J. L. Berry. Professor A. Colin Renfrew and Mr. John Dixon kindly provided the analyses of obsidian samples from site 1072 that are referred to as part of the description of that site in chapter 7, and Dr. Stephen R. Lintner identified a marine shell from the same site. And while a degree of “antiurban bias” may be inescapable when one undertakes to rectify the prevailing neglect of the countryside by most archaeologists and historians, Professor Aage Westenholz has properly induced me to soften a few of the more orotund expressions of it.

The many problems of Arabic transcription are treated herein with consistent casualness. Common words and names are rendered throughout in their most popularly recognized English form. Vowel length is only occasionally indicated for the less common names, especially geographical ones. The names given for archaeological sites in chapter 7 in most cases seek to render the spoken dialect of local informants, but some have also been drawn eclectically from a variety of English and Arabic maps of various dates that may or may not offer a more standardized version. Compounding the unreliability of any such compilation, therefore, are the different periods of currency of its components. As discussions to be found in chapter 5 and under site 1389 in chapter 7 attest, except for the largest, longest-lived sites, geographical nomenclature often appears to have been made rather transient by the advent of unsettled conditions. The only recourse of those who may wish to visit the overwhelmingly larger proportion of the archaeological sites on which this study is based accordingly is an assured knowledge of fairly precise compass navigation in country very modestly endowed with stable landforms or permanently recognizable landmarks.

It remains, finally, to take grateful note of the various forms of institutional and financial assistance without which this project would not have been possible. Support for the 1968 reconnaissance was provided in part by the Baghdad School of the American Schools of Oriental Research, of which I was resident director for that year. The major 1975 campaign was funded primarily by a grant from the National Science Foundation (NSF-SOC-74-12491), which also substantially defrayed the direct and released-time costs of the preparation of this volume. And the Oriental Institute not only has underwritten some of the costs of fieldwork and the preparation and publication of the manuscript, but has consistently provided the unique scholarly setting in which independent, long-continuing field undertakings are accepted as a primary responsibility both of individuals and of the institution itself.

# 1

## Water, Land, and Life

The Euphrates River of this study is a source of water and sediment, change and permanency in a harshly arid setting whose other natural resources are notably few. It makes fertile a green ribbon of cultivated fields and orchards, interspersed by the desolate ruins or bustling modern descendants of the world's most ancient towns. Shifting its course in greater or lesser degree as it rises each spring, it periodically contradicts its promise of security and contentment with the hardship of drought-induced low water or the devastation of floods. But in the long run, overriding all such vicissitudes, it has provided the only possible foundation for an immense column of human achievement that has risen laboriously in a pivotal region over hundreds of generations. It is, in short, a brown, sinuous, pulsing artery that carries the gift of life.

The Euphrates course is generally regarded as beginning at the confluence of the Kara Su and the Marat Su in south central Anatolia, whence it descends steeply through an alternating succession of rich valleys and difficult gorges until it reaches the elevated Syrian plain at Samsat. Entrenching itself in a broad, steep-sided valley, the river meanders across this plain for more than 1,400 kilometers to the head of the lower Mesopotamian alluvium at Hit. In this long reach, the slope of its bed is abruptly reduced, and midway across it the Euphrates receives its last important tributary, the Khabur. At Hit, still more than 700 kilometers from its mouth, the low-water elevation of the Euphrates is barely over 50 meters above sea level. Thence it enters the Mesopotamian alluvium, periodically bifurcating and rejoining in a naturally anastomosing pattern while also dividing the greater part of its flow into the hundreds of dendritic arms of irrigation canals. At the lower end of the plain it merges with the waters of the Haur al-Hammar, a permanent, marshlike lake, then joins the Tigris to form the Shatt

al-Arab and reaches the Arabo-Persian Gulf southeast of Basra.

The Euphrates, as thus sketched, is not one of the great rivers of the world in length, volume of flow, or size of watershed. As a river that is preponderantly a source for irrigation, perhaps the volume of water it carries is the most useful variable with which to illustrate its comparative position. In rough orders of magnitude, its average flow is only one-third that of the Rhine or Nile, or a mere tenth that of the Danube or Volga. Not to speak of giants like the Amazon or Congo, it is altogether dwarfed by relatively large rivers like the Mississippi and Yangtze, which are more than twenty-five times its size. It is even overshadowed in average volume of annual flow by its "twin" river, the Tigris, approximately in the proportions of five to three (Ubell 1971, p. 3). Perhaps its closest comparison in volume is with the Colorado River, which, like the Euphrates, also has its headwaters in rugged mountain country, traverses a broad semiarid to arid belt, and is sharply reduced by human use before it reaches the sea.

But it cannot be overstressed that there are few if any other streams, regardless of size, that have played so central and long-continuing a role in human history. The formative processes leading to the world's first urban civilization cannot be understood except as a creative adaptation to the priceless resource of Euphrates water. Vigorous later traditions in political economy, religion, administration, literature, and art continued to build on the foundation of an assured food supply that the Euphrates made possible. Even the land itself, the alluvial plain of southern Mesopotamia, is in large part composed of silt that the river carried down.

This study is about the greater part of the heartland in which Sumerian civilization arose during the fourth and early third millennia B.C., a small but central portion of

the Euphrates floodplain. Hence there is no need for a more extensive description of the Euphrates itself, although we must deal with aspects of the behavior of the river that have influenced patterns of human action. As is set forward more fully in chapter 2, my concern is not only focused on a pivotal region but largely confined to it by the limits of an extensive but still definitely bounded archaeological survey that has furnished the primary data. And I must concede that the boundaries of that survey, however convenient and necessary they were for the design of an intelligible and systematic program of research, have essentially no correspondence to traditional boundaries of human action or relationship other than in the present and very recent past.

Thus this is not in any sense a study of the role of the entire Euphrates in history. Probably the proper geographic unit of analysis for that quite different undertaking would be its entire watershed. A watershed is only another topographic unit, of course, and need never have coincided with a historical and cultural unit of any significance. But in this case there are many leads to a recurrent unity within the Euphrates basin that deserve to be explored, even if that far-ranging task cannot be adequately undertaken here.

There were, to be sure, extended periods when deep sociopolitical divisions lay athwart the Euphrates in Syria or Anatolia, far above the northwestern extremities of the alluvium at the lower end of its valley. That was almost continuously the case during the interminable rivalries between the Parthian, Sasanian, 'Umayyad, and early 'Abbasid empires, on the one hand, and the Romans and their Byzantine successors on the other. But even during these lengthy intervals the frontier was less often a fixed demarcation of actual movements than a shifting gradient. Caravans as well as shallow-draft riverine commerce followed the line of the Euphrates when possible, from the cities of the Levant to Charax Spasinou, Ctesiphon, Baghdad, and the Arabo-Persian Gulf, as they continued to do into the nineteenth century. Armies, with their irregulars, supply trains, and camp-followers, and on occasion their prisoners and the masses of population they forced into exile, did likewise. Seminomadic tribes alternately bartered their support to, and preyed on, both caravans and armies. Even when a durable military demarcation was the objective of both sides, therefore, the middle valley of the Euphrates was probably always closer to being a long and tenuous but effective bridge than an impermeable barrier.

There were other times when it is difficult to discern formal barriers of any kind, and when intercommunication was so close as to suggest a degree of cultural unity. The first of these occurred in late prehistoric times, in the latter part of the fourth millennium, with a site like Habuba Kabira on the middle Euphrates (Heinrich et al. 1969-73) mirroring many features of Late Uruk period occupations at better-known sites like the ancient city of

Uruk in southern Mesopotamia. Similarly during the third and early second millennia, archaeological finds from Tell Brak on the Khabur River and textual as well as archaeological finds from ancient Mari on the Euphrates in Syria attest to a close and at least partly dependent relationship with southern Mesopotamia. The extraordinary recent finds at ancient Ibla, on the other hand, demonstrate a high degree of linguistic as well as political autonomy even in a context of far-flung and intense commercial relations (Gelb 1977). During these and other similar intervals, it appears, the valley of the Euphrates was a vital, heavily traveled artery of interregional contact between Mesopotamia and the world around the Mediterranean. Perhaps the topographic limits of its watershed are no more meaningful a framework in which to consider these intervals of rapid, wide-ranging, and yet obviously close interaction, therefore, than the geographic boundaries of the alluvium in general, and of this study in particular, are for a different, more narrowly defined set of problems.

Southern Mesopotamia was a land of cities. It became one precociously, before the end of the fourth millennium B.C. Urban traditions remained strong and virtually continuous through vicissitudes of conquest, internal upheaval accompanied by widespread economic breakdown, and massive linguistic and population replacement. The symbolic and material content of civilization obviously changed, but its cultural ambience remained tied to cities. How firmly the occupants of the lower Mesopotamian plain ever recognized that alluvial terrain as a special object of attachment is uncertain, but their enduring loyalty to familiar associations and localities within it—to cities—is not a matter of doubt. Here we are concerned with the material conditions that must have played an important part in originating and sustaining these roots of attachment. And it is impossible to escape the conviction that irrigation agriculture—or the comparative security, population density and stability, and social differentiation and complexity that it induced—was at the very heart of these material conditions.

Leo Oppenheim (1950) has drawn an evocative contrast between the rootless, wrathful storm gods of the lands around the Mesopotamian perimeter, which depended on rain agriculture, and the irrigation zone gods whom city folk sustained in temples in their midst. The point is not to argue that the arrow of causality must be directed unilaterally toward religion as a dependent growth or epiphenomenon, however, but to suggest that at the root of any civilization there probably has to be a congruence between modes of agricultural production and sociocultural (surely including religious) institutions more generally. To sketch that congruence or harmony in detail is the task of many specialists, principally in the linguistically and topically diverse genres of textual material. Here we deal primarily with the other side of the

equation—with the adaptive base for settled, urban life that was provided by the Euphrates landscape.

### RIVER AND ALLUVIUM

From a relatively early time, well back into the third millennium B.C., the name most generally given to the Euphrates in lowland Mesopotamia was the "Sippar River." Disagreements persist over other names that occasionally were applied locally or in a primarily literary context. Also obscuring the matter of nomenclature are many ancient texts that speak only of "the river," since its name was obvious to the intended readers. As a general name applying to the whole system of branches, it appears at present that we can do no better than what was pronounced as "Buranunu" or "Purattu" in the later Sumerian and Akkadian vocabularies (Adams and Nissen 1972, p. 44).

Sippar, in turn, was the name of an ancient, long-lived, but fairly modest town on the Euphrates. An antediluvian dynasty there appears in the Kinglist, but at least in fully historic times it was never a dynastic capital. Accordingly, it is unlikely ever to have been a dominant political or economic power outside its immediate sustaining region. Its distinction, accounting for the application of its name to the whole network of watercourses serving many more important cities, must be at least in part that it lay at the uppermost extremity of the alluvium, closest of all the traditional towns to the point at which the Euphrates debouched onto the lower plain from its broadly incised middle valley. Possibly this suggests a long-standing, traditional awareness of the alluvial plain as a distinctive zone, with Sippar the point of its beginning. I shall follow that assumed usage, dealing with the river hereafter only as it emerges onto the alluvium itself.

Figure 1 summarizes the major variations in modern Euphrates flow as recorded at Hit, slightly upstream of ancient Sippar but indistinguishable from it in these characteristics. Average monthly measurements over a thirty-five-year period are recorded, as well as monthly maxima and minima. Since water is needed for irrigation at no less than monthly intervals during the primary winter growing season, it is these monthly figures rather than the annual totals that have the most critical effect upon the fortunes of the cultivator. A succession of late fall and early winter months of unusually low water, coupled, as would normally happen, with less than average early rainfall, can seriously cut back harvests even if the spring floods are well above the normal level. Clearly, the Euphrates is a somewhat capricious and undependable provider of the water that is vital for irrigation, at least for those inferior in politicomilitary power or not otherwise advantageously situated to satisfy their own needs without regard to competing claims.

The Tigris, unlike the Euphrates, has a number of left-

bank tributaries along its entire middle course that stem from catchment basins on the lower flanks of the Zagros. Rainfall in these basins accounts for a large proportion of its flow, and disastrous flooding on the plains below can follow heavy, widespread precipitation at any time during the winter rainy season. The "normal" but highly variable seasonal flood, added to by a component of melted snow, comes in April. The Euphrates receives only the modest contributions of the Balikh and Khabur as left-bank tributaries. A higher proportion of its flow consequently derives from the more elevated interior of the Anatolian plateau. Hence the Euphrates flood comes with later-melting snows, in early May, as figure 1 shows. High water at that time is essentially too late to affect the May and June harvest—unless it inundates the mature crops with a destructive flood. Even in good years, in short, the timing of the arrival of high water in both the Tigris and the Euphrates is poorly synchronized with the needs of cultivators on the alluvium.

Present patterns of Euphrates water utilization obviously can be described in greater detail than those for any historic period. While we shall see that in some respects they differ greatly from those of the more ancient past, and that there were also striking divergences among the latter, it is reasonable to regard the basic features of the river regime as constituting a relatively constant set of conditions to which ancient as well as modern agriculturalists would have had to adapt in essentially similar ways. Hence it may be useful to trace in fuller detail some of the contemporary constraints that the Euphrates imposes on human life.

The advent of efficient pumps, cheap fuel, and modern excavating machinery has greatly reduced the real cost to the farmer of securing a supply of irrigation water. Forward deliveries throughout the growing season cannot be assured in view of the vagaries of the Euphrates flow, however, and the total supply remains in active contention among a growing number of potential users. Hence there is a strong predisposition to apply excessive irrigation water whenever conditions permit. Present use has been estimated at 13,300 cubic meters per hectare per year, equivalent to a uniform depth of 1.33 meters on all cultivated land, and not surprisingly this is grossly in excess of crop requirements (Ubell 1971, p. 9). Considering winter-grown cereals alone, still the heavily preponderant form of agricultural produce and for all earlier periods the absolutely decisive one, requirements for consumptive use may be more reasonably approximated at 0.55 meters. With roughly half again this amount needed to cover evaporation, seepage, waste runoff, and other losses, this amounts to a gross diversion requirement of about 0.83 meters, or 8,300 cubic meters per hectare (FAO Mediterranean Development Project 1959, p. III-2). Under modern conditions it may be realistic to plan for a reduction in the large coefficient of loss, but a gross diver-

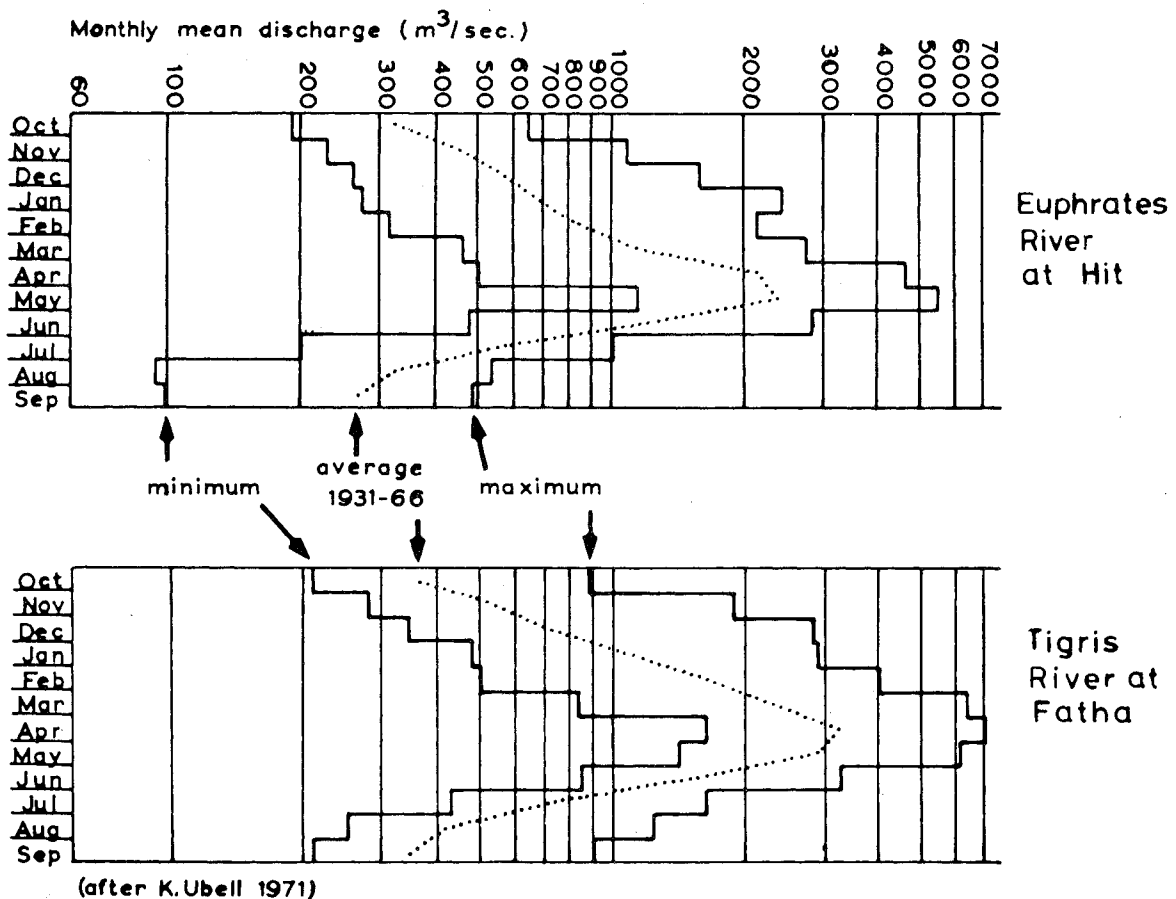


Fig. 1. Variations in Euphrates and Tigris River discharge.

sion of at least this general magnitude probably may be assumed as the historical requirement for attaining average yields under traditional conditions of agriculture.<sup>1</sup>

The modern pattern involves increasing attention to regulators and structures that will control water distribution and utilization and that ultimately will permit central managerial decisions to place a brake on excessive use. Upstream water storage facilities also are being introduced as rapidly as their heavy capital and technical requirements permit. These will encourage a shift toward increased cultivation of cash crops during the summer low-water season and will help to smooth irregularities of seasonal flow so as to permit an enlargement of cultivated hectareage. Because factors of production have not been equally and simultaneously available, however, the modernization of Iraqi agriculture heretofore has involved only a limited shift away from its traditional subsistence orientation and only very moderate increases in the total arable area. And water withdrawals, though they have risen steeply to the point where periodic shortages are a critical factor in further agricultural development, still involve very limited use of aggregate seasonal

flow. As late as 1959, gross agricultural diversions (for both Tigris and Euphrates) were estimated at as low as 16.6 billion cubic meters per year, less than a fifth of Iraq's potential surface-water resources (FAO Mediterranean Development Project 1959, pp. III-1-2; Ubell 1971, pp. 3-4).

These modern conditions, connected though they are with stimuli toward rapid development, have led to a rapid intensification of problems of salinity. As much as 70 to 85 percent of total land under irrigation is said to suffer from the effects of salinization (FAO 1959, p. III-12). The physicochemical processes involved, as well as their relationship to traditional agricultural practices, may be succinctly described as follows:

Whenever the water table rises to  $1\frac{1}{2}$  metres from the surface, capillary action is sufficient to carry the salt to the surface, where the water evaporates and leaves a layer of salt. This applies especially to the sub-soil of many parts of the Tigris and Euphrates valleys. Soils with 0.2 percent soluble salts in a surface of 15 centimetres may have more than 1.0 percent in the second metre and so

are threatened by excess salinity; 0.2 percent in a surface of 30 centimetres is detrimental to most crops, while percentages as high as 1.0 will prevent the growth of all except the most salt-tolerant crop species. If the sub-soil water contains as much as 0.5 percent salt, and the water table is within 1½ metres of the surface for a few months each year, the area is likely to go out of production in five years or less. All areas where the water table approaches that critical level during any part of the year will need a drainage system if production is to continue.

The methods used by the Iraqi farmers have often been criticised; it has been said that they are wasteful of water and not suitable for high yields and productivity. It is true that the wild flooding most common in the irrigation of grain fields does not ensure equitable distribution and efficient use of the water. But as the land was not levelled, this was the only practicable method. Moreover, the excessive irrigation practised with this system in most cases is justifiable in saline soils as a means of pushing the salt out of the surface and the root zone, so as to establish a good stand and carry the crop through to maturity. In the absence of drains, the field was left in worse condition at the end. The dangers of salination were enhanced by the rise of the water table. But the farmer had learned to move to new land and not to come back until natural forces and weeds were given the time to lower the ground water table and dried the soil to a point where a crop—usually poorer than the preceding one—could be grown again. This has been the adaptation of the Iraqi farmers to adversities in their environment with which they could not cope otherwise. They have thus succeeded in surviving this environment . . . having learned “to live with the salt in the land.” [FAO 1959, pp. III-13, 24]

It should be apparent from the foregoing discussion that salinization is a generic problem of Iraqi agriculture. Among contributing factors are high evapotranspiration rates caused especially by extreme summer temperatures, limited surface runoff owing to very low alluvial gradients, and even more limited lateral movement of the always highly saline groundwater as a result of fine sediment size and poor soil structure. But it is also clear that the challenge of “living with” salt is variable, not constant. Its sometimes severe effects can be traced into the ancient past, but total, irretrievable losses of productivity are not suggested by either the historical or the archaeological record—even in the absence of the massive drainage programs on which modern agricultural development increasingly relies (Jacobsen and Adams 1958; Adams 1965, pp. 17–18). The pervasive modern problem, in other words, is not to be understood as the direct, ineluctable outgrowth of natural forces. Salinization is indeed a recurrent, widespread condition on the lower Mesopotamian plain, but its recent, rapid intensification and heavy economic impact are also products of the unprecedented technical and institutional means with which

modern agriculturalists are seeking to adapt to the perennial uncertainties of Euphrates water.

As I noted earlier, the monthly flows recorded in figure 1 approach more closely than any annual totals the conditions to which farmers of any period would have had to adapt. In the absence of any possible provision for extensive water storage before very recent times, it was minimum reliable flows at certain critical junctures during the winter growing season that set limits on the extent of cultivation—and hence indirectly on the population of the alluvium. We shall see presently that organizational, not technical, means were found to transcend those limits during certain times of unification, stability, and heightened rural investment like the Sasanian period, and that at such times demographic levels responded accordingly. But for by far the greater part of the plain's history of human occupancy the limits were forbiddingly real, and establishing even very roughly what they were is correspondingly important for an understanding of that history.

A perduring part of Mesopotamian agricultural practice is the application of a limited number of cycles of irrigation water during the winter growing season. Smaller, more frequent applications would impose the unreasonable requirement that water supplies be maintained permanently at adequate levels in all components of the extensive canal systems and would also greatly increase losses through evaporation and seepage. This practice of well-defined, short intervals of watering is first identified for us already in the Sumerian *Georgica*, or “farmer's almanac,” known from second-millennium copies but surely reflecting practices that were already old in the third millennium. The *Georgica* speaks of the need for a preliminary watering before the first plowing and seeding in the fall, then describes four iterative applications before the harvest between late April and early June (Salonen 1968, pp. 202–12). Four or five waterings also were specified by Ibn Wahshiyya, writing of estate management no later than the tenth century A.D. (El-Samarraie 1972, p. 62), and are reported as still typical today (Adams 1965, p. 16). If we take into account the winter cereal requirements for consumptive use that were indicated earlier, some 0.55 meters of water over the cultivated surface, it is apparent that the average amount of water supplied in a single monthly watering should be slightly more than 10 centimeters. An only insignificantly smaller figure (9.6 cm) can be established from an eleventh-century Islamic text providing calculations of areas of winter crops that could be irrigated with *norias* and other irrigation lifting devices (Cahen 1947–48, p. 130). Working with this amount as a customary rule of thumb, further use can be made of the monthly Euphrates flows that are recorded in figure 1.

What is crucial is that fall and early winter flows sharply restrict the amount of land that can be irrigated.

Let us concentrate upon the recorded averages, while recognizing that half of any given sequence of years probably would not have reached these amounts and that a better approximation of the reasonably reliable flows limiting agriculture are likely to have been only about two-thirds as much. The following tabulation records both the approximate monthly flows of the winter growing season and the total areas that could be irrigated if the entire Euphrates flow were diverted to this purpose:

Month	Flow in Cumecs ( $m^3/second$ )	Area ( $km^2$ )
October	350	6,048
November	450	7,776
December	600	10,368
January	700	12,096
February	800	13,824
March	1,200	20,736
April	2,100	36,288

The figures in the right-hand column take into account winter crop requirements of 0.55 meters and losses of one-third of gross diversions through evaporation, seepage, and so forth, but they ignore the aforementioned difference between reasonably secure minimum flows and recorded averages. Even more plainly unrealistic is the assumption that the entire early flow could be diverted, leaving the lower course of the river absolutely dry. Further, the right-hand column disregards competing domestic requirements and the heavier consumption of other forms of land use such as vegetable gardens and orchards. What these calculations do establish, therefore, is an upper limit of surely much less than 12,000 square kilometers—probably on the order of 8,000 square kilometers or even less—that could be adequately irrigated in any given season with Euphrates water even if the time of initial plowing and sowing was extended from October until as late as the end of January. (The total arable area, cultivated on the basis on alternate years in fallow, was of course twice as large.)

Why, one may ask, would the time of sowing not have been extended later than January in order to take advantage of the Euphrates' normal late spring maximum? Some variation in sowing season was indeed explicitly prescribed by Ibn Wahshiyya as a means of permitting at least part of the crop to be salvaged in the event of blight, drought, or flood (El-Samarraie 1972, p. 60). But the crucial contrary consideration is that later sowing would also delay the harvest, and that postponing the latter until after the advent of hot summer weather entails rapidly mounting losses from crop diseases, insects, and other pests. In the traditional agricultural regime, therefore, rising population and an extension of the agricultural frontiers impose irrigation requirements that

can be met only if a growing proportion of cultivators postpone sowing, with, as a further consequence, unrecorded but by all accounts very heavy losses in agricultural output.<sup>2</sup>

But what of the Tigris? Why should that even more impressive source of water be excluded from these calculations? The Euphrates watershed was, to be sure, the primary region of ancient settlement. Why were all but two or three of the known historic towns of any importance before Hellenistic times distributed along branches of the Euphrates rather than the Tigris if the timing of the flood on the latter was certainly not inferior to that on the former and perhaps was slightly more favorable? Two factors contribute to an answer.

First, the greater size of the Tigris was more of a danger than an attraction to societies with limited technical means. More dependent on rainfall in its watershed, it therefore also floods more rapidly and destructively after winter and spring storms. The 1954 Tigris flood—the worst of modern times, although well below the theoretical maximum that hydrographers can conceptualize from rainfall characteristics—brought a raging, uncontrollable crest of 16,000 cubic meters per second (cumecs) below Baghdad at the confluence of the last left-bank tributary, the Diyala. The greatest modern flood on the Euphrates, by contrast, was the 1929 crest of 5,200 cumecs (FAO Mediterranean Development Project 1959, p. II-5; Wölfel 1962, p. 164). The latter, too, was far beyond the capabilities of existing bunds; periodic catastrophic floods are common to both rivers. But the difference between normal and extreme was less, even taking into account the lesser average flow of the Euphrates, and in that sense the Euphrates has always been more manageable. Within the constraints of ancient technology, even enormous investments of human labor in bunds and other protective works along the Tigris provided only very qualified security. Towns founded in its vicinity had to be sited at such a distance from the river that some of its advantages were lost, or else they were periodically exposed to inundations so severe that the only safety lay in general abandonment.

A second factor is immediately apparent to an observer today, although the equivalence of conditions in the fairly remote past is perhaps problematic. The Tigris today enters the alluvium as a single great stream immediately below the modern town of Samarra, and it remains one for 400 kilometers more. The Shatt al-Gharraf is a major right-bank effluent at Kut, to be sure, but at least under modern conditions its successful operation depends on the existence of a barrage across the Tigris. Nothing suggests that any such weir lay within the earlier limits of human capability. For most of this distance, then, the Tigris was and is not only more turbulent and unpredictable as a potential source of irrigation water, but also more deeply entrenched. Usable canal off-



takes could be cut through its banks if the canals themselves were extended far enough down the backslope of the Tigris levee to provide a water level higher than the adjacent fields to be irrigated. But such offtakes were directly exposed to the worst the Tigris had to offer. Built only at a heavy cost in labor, they could be suddenly swept away or submerged beneath a deep blanket of silt. In flood, the Tigris bed load may reach twenty thousand parts of silt per million, five times that of the Nile and more than three times the highest level known for the Euphrates (Cressey 1960, p. 144). Insofar as the modern Tigris regime is an accurate index to the ancient one, then, that river must long have seemed both too difficult and too unpromising to tame for irrigation. In the absence of other constraints, a less risky decision for a Sumerian or Babylonian ruler with human resources adequate to divert a part of the Tigris was to use them instead for subjugating his smaller Euphrates neighbors.

It must also be observed, however, that the right bank of the Tigris was eventually canalized fairly extensively. The base map of the survey makes this immediately apparent. Although some of the ancient levees shown in that area might once have been the tails of Euphrates canals having their origins far to the northwest, others can only be explained as drawing their supplies directly from the Tigris. From the clarity and continuity of canal traces on the air photographs as well as from the details of ancient settlement uncovered by the survey, it is clear that all or virtually all of this activity dates to Hellenistic and later times—principally Sasanian and Early Islamic. There are occasional references to earlier canals emanating from the Tigris (see below, pp. 134, 159), but nothing suggests that they continued to function over long periods or achieved real economic importance. The few towns like ancient Akshak/Upi that definitely were situated along that river lacked political importance as well and probably should be regarded as maintaining their own small, autonomous irrigation enclaves. Only at a fairly late date, then, did the inhabitants of the alluvium undertake to utilize the Tigris on an extensive scale. That new capacity is appropriately symbolized by the choice of a Tigris site first for the Hellenistic city of Seleucia, later for the Parthian and Sasanian capital at Ctesiphon, and finally for the 'Abbasid founding of Baghdad.

These developments portend more than the overcoming of some localized barrier to settlement. A characteristic of the vast canal system that was introduced by no later than the Sasanian period was that provision was made to supply almost all of its component elements not merely from the northwest, along the main gradient of all Euphrates canals, but from the northeast. Surely the explanation for what would otherwise constitute an inexplicable case of overdesign of the system at gigantic cost is that Tigris water was periodically supplied to areas that formerly had had to depend exclusively upon

the Euphrates. And therein lay a way to escape the restrictions of Euphrates flow during the early winter growing season. Tigris water could provide a vital supplement at a time when it still posed little danger of serious flooding and when its silt load was still relatively moderate; then, as the season advanced, the headworks could be closed off and protected insofar as possible and the entire burden of irrigation shifted to the now greatly enlarged Euphrates. It was a scheme of extraordinary comprehensiveness, entailing the artificial reshaping of the relationship between major rivers and their many effluents and an unparalleled degree of direct state intervention in day-to-day irrigation management. These impressive advances ultimately proved to be accompanied by a corresponding growth of new and unprecedented risks, but their immediate effect was to support a proliferation of new cities and a dramatic rise in population. By early medieval times, then, agriculture and settlement on the lower Mesopotamian plain are no longer to be thought of as consequences of the deployment of the Euphrates alone but must be seen as mushrooming outgrowths of what had become a single, interdependent system integrating the waters of both the Euphrates and the Tigris.

Save for this impressive but transitory achievement, the concern of this study is focused on the Euphrates as the primary influence on historical patterns of Mesopotamian settlement. Several features of its regime need some reference here, in addition to the effects of variability in its monthly and annual flow that I have already described. Its course, in the first place, is typically an *anastomosing* one for a considerable part of its traverse across the alluvium to the head of the Gulf. This implies a natural pattern of multiple channels, separating and rejoining, rather than the single incised one that the Tigris maintains until its lowermost reaches. Since the flow is divided among a number of smaller, less dangerous channels, correspondingly smaller, more easily initiated and managed systems of canal irrigation are sufficient. For an anastomosing pattern to exist, moreover, we are necessarily dealing with an aggrading stream that regularly overtops its banks and maintains an elevated bed on a natural levee made up of sediments carried down by the stream itself, either as a moving bed load or in suspension. The general process may be briefly described as follows:

Deposition on levees occurs when a stream overtops its banks. The velocity is checked, so that not all of the previous load can be transported, and sediment is deposited adjacent to the banks. The coarsest debris is laid down close to the channel and the finer material further down the levee at a greater distance from the stream. Deposition rate is at a maximum close to the channel and declines down the levee, giving the slope into the floodbasin. When a stream is not in flood, its levees are

attacked by atmospheric agencies and in particular are eroded by rainfall. [Allen 1965, p. 121]

This setting has obvious advantages for technically ill-equipped irrigators. The backslope of the levee, leading away from the stream and into an adjoining basin or depression, provides natural drainage and is highly suitable for cultivation. Yet at least the upper surface of the stream itself is generally elevated in relation to this land surface. Fairly short, shallow cuts in its banks are sufficient, therefore, to bring water out onto the backslopes at or above the land's level, establishing "command" of it for irrigation. There is, to be sure, a more troublesome corollary to these advantages. Anastomosing stream channels are not naturally fixed but are given to movement, both through continuous processes of lateral channel-cutting that accompany aggradation and through more extensive course substitutions during periodic flooding. The attendant cost of irrigating these areas, as we shall see, is a continuing and not always successful battle to maintain a gradual, manageable rate of channel change that minimizes destruction of canal headworks along the banks and that prevents towns from being suddenly isolated from their water supply.

The history of the Euphrates floodplain includes examples both of abrupt, permanent channel replacement and of slower movements marked by repeated restorations. Sudden avulsions are seemingly less characteristic, even though the water level exceeds the elevation of the backslope depressions during the winter and spring portion of the hydrological cycle. Bank failure during times of high water is accompanied by a sudden decrease in the velocity of flow and a consequent tendency for sediments to be deposited, filling the gap. Hence most escape crevices are healed when the river stage falls. In some cases, however, a distributary is formed that can maintain a channel throughout the year. If its course length and gradient offer a comparative advantage, such a distributary can gradually enlarge (primarily through the erosive processes associated with a succession of high annual floods) to become a permanent diversion (Schumm 1977, pp. 304-5).

A second morphological feature, applying in this case to the Tigris as well as to the Euphrates, is that the channels generally exhibit meander patterns. Meander geometry is exceedingly complex and for the most part need not concern us here. Minor stream sinuities are related to variations in bed load and current, and the latter in turn initiate erosional and depositional variations on opposing banks. Individual meander loops develop gradually out of these, affected by many factors including stream volume, slope, and bank material. Ultimately meanders develop to a point where a cutoff occurs more or less directly across the neck of the loop, leaving the old channel as an oxbow lake that gradually fills with

sediment, and the whole process begins again. These continuing, localized movements also widen the stream levee into a much broader and more regular meander-belt levee that encompasses the extremes of amplitude of the entire sequence of meanders.

Meander loops on other rivers, in addition to their growth in a direction perpendicular to the prevailing course of the stream, frequently exhibit an asymmetrical cutting pattern that involves them in slow downstream migration or "sweep" along the course. That pattern, were it to occur commonly in Mesopotamia, would have had very destructive effects on many of the remains of ancient settlement that directly adjoin stream channels. However, comparing contemporary maps with navigation charts drawn more than a century ago provides little if any evidence of "sweep." Sporadic cases of it can be seen in the air photographs along former channels, one of which will be discussed presently, but for this alluvial plain as a whole meanders generally are limited to lateral growth followed by extinction through cutoff.

A substantial body of research indicates that meanders must be understood as systemically derived from hydrological principles and cannot be dismissed as random or episodic. Meander geometry can be characterized by a series of more or less regular relationships between observed variables, such as stream width, stream flow or discharge, and meander wavelength, amplitude, and radius of curvature. To be sure, not all of these relationships are equally invariant. Along the lower Mississippi River, for example,

one considers natural levee patterns and spacing, not channel width, to decipher channel history or correlate a channel segment with some upstream equivalent. The bends along a channel with higher discharge will be more widely spaced and the loops of meanders will be long in comparison to the meanders along streams with lesser discharge. I have found that average distances between bends along a channel for an airline distance of 100 miles or more provide a far better index of river discharge than conclusions based on criteria such as measuring radii of curvature. [Russell 1967, p. 74]

The nature of the relationship between meander spacing or wavelength and stream discharge can be further specified. It might seem that the maximum rate of meander cutting would occur at bankfull stage, but experimental and empirical studies suggest that a range of discharges during falling stages instead exercises the dominant influence over meander wavelength. This explains a much lower standard error of correlation of wavelength ( $L_m$ ) with either mean annual discharge ( $\bar{Q}$ ) or the mean of the month of maximum discharge ( $\bar{Q}_{mm}$ ) than with bank full discharge ( $\bar{Q}_b$ ). At any rate, these relationships are reported to take approximately the following forms:

$L_m = 106.1 \bar{Q}^{0.46} = 80.0 \bar{Q}_{mm}^{0.46} = 8.2 \bar{Q}_b^{0.62}$  (Carlston 1965, p. 885).

Almost certainly, however, no statement of the relationship that is confined to these two variables, discharge and wavelength, can be wholly satisfactory. Empirical studies have shown that average particle size in the sediment load also influences meander wavelength, and that the kind and density of local vegetation may also be a factor. Whether for these or other reasons, different investigators have derived slightly different quantitative expressions for the key relationship between wavelength and discharge under widely differing geographic and climatic conditions (Gregory and Walling 1973, pp. 241–55).

As I have noted, meander development is directly related to stream discharge. Meander wavelength increases with increasing flow. One can also express meander development in terms of increasing length of channel as a multiple of the linear distance traversed (index of sinuosity). Higher indexes of sinuosity imply a declining channel gradient, and it follows that volume of discharge is inversely proportional to gradient (Schumm 1977, p. 134). One must remember, however, that many other factors are at work, so that changes in discharge cannot be uncritically imputed from changes in meander characteristics. In particular, meandering is a time-dependent, perhaps even cyclical, phenomenon:

It seems that once a meandering pattern is established, the hydraulic conditions in the bends and variations in bank material cause enlargement in meander amplitude and decrease of radius of curvature until eventually a cutoff occurs. Cutoff of one bend will by local steepening of the channel gradient cause scour upstream and deposition downstream of the cutoff. Both processes are likely to trigger additional cutoffs by increased bank erosion upstream and by increasing flood heights downstream. In a reach meanders may enlarge to a critical threshold of high sinuosity when, because of greatly reduced gradient, aggradation will precipitate cutoffs. Inevitably, meander growth will lead to a threshold of channel instability, at which point the channel will straighten out. However, this process may involve very different periods of time, depending on water discharge, sediment load, and the nature of the sediments comprising the bank material. [Gregory and Walling 1973, p. 142]

Next we may consider the question of sediment load, already presupposed by the processes of levee formation—and, in fact, by the existence of the alluvium itself. An influential contribution of a generation ago on this subject needs to be presented at some length, since it will presently be seen to have an important bearing on contemporary understandings of riverine history:

The Euphrates has an average silt content at Ramadi (at

a point near the surface of the stream at the centre of the river) of 553 dry grammes per cubic metre and the average discharge of the Euphrates at Hit throughout the year is 710 cubic metres per second. Corresponding figures for the Tigris at Baghdad are 787 dry grammes per cubic metre and 1240 cubic metres per second. Assuming a specific gravity of 2 for the compacted silt this gives  $76.2 \times 10^7$  cubic feet of silt per year as the annual burden distributed by the combined rivers; spread out over 100 square miles it would have a depth of 3.28 inches. As the silt content in other parts of the river would be considerably greater than at the centre of its surface (average figures are being used for flow) this rate of accumulation can be regarded as a minimum only. It has been estimated that the Karun carries down 1.1 million cubic yards of silt every year, which is equivalent to 0.13 inches spread over 100 square miles. The Karun silt is carried into the Persian Gulf but the silt of the Tigris and Euphrates is deposited in the extensive marshes into which their flood waters flow. The amount of silt carried to the sea by the Shatt al-Arab is such a small proportion of the total that it can be neglected in these calculations.

The area of the lakes and marshy areas over which the Tigris and Euphrates can distribute silt is about 1500 square miles, so that if all the silt burden of these two rivers was deposited in them, its minimum average thickness would be 0.22 inches per year. The actual amount of silt distributed annually may be much greater and, taking windborne silt into account, it would seem that these marshes and lakes could not survive more than a few hundred years unless they were rejuvenated in some way. [Lees and Falcon 1952, p. 29]

I will postpone for later discussion the fundamental thrust of this work, concerning the rate of recession of the head of the Arabo-Persian Gulf. But there are problems with details of the arguments offered in the foregoing passage that are relevant to our consideration of entirely different themes. First, some additional doubt must be interjected about the basic sediment load measurements on which Lees and Falcon relied, although they have seemingly been cautious in citing them as “a minimum only.” Generalizing about such measurements, an authority on alluvial stream behavior has observed:

Estimates of transported sediment load have little meaning, except for the places where measurements are made. A river is far more turbid between a scour pool and the next bar downstream than between that bar and the following scour pool. Transported load always has an important component of motion toward places where turbulence is less intense. [Russell 1967, p. 70]

While an enormous mass of suspended material is undeniably carried down annually by the twin rivers, there are accordingly some grounds for doubt whether the specific figures offered above can err only in the direction of being too small rather than too large (cf. Buringh 1960,

p. 51). But a much more substantial difficulty arises from the authors' assumption that all this silt can be considered as being deposited in lakes and marshes of relatively limited area. Agronomists and irrigation engineers working in the vicinity of Baghdad, at the opposite end of the alluvium from the low-lying lakes and swamps, have long been conscious of the recent and ongoing deposition of sediment in that region. Apart from the very considerable accretions represented by the broad river levees, the countryside is crisscrossed by the great ridges of former canal spoil banks that are often 3–5 meters and more in height. And active deposition of course extends into every field that irrigation water reaches. Buringh and Edelman, for example, found from 20 centimeters to 1 meter of recent silts over heavy basin clay in irrigated fields within a transect between the Tigris and Euphrates southwest of Suwaira. Irrigation levees covered about half this transect, they observed, and basins (which of course consist of thinner layers of finer-textured sediments, also of riverine origin) covered the other half (1955, pp. 41, 45). An immensely wider region of ongoing silt distribution than Lees and Falcon consider thus must be taken into account—as wide, in fact, as all the land that is irrigated and seasonally flooded.<sup>3</sup>

Aeolian erosion and redeposition is a further factor, to which I will return more systematically. Most of the unconsolidated, wind-borne material consists of fine, sand-sized particles, the greater part being crumbs of silty clay loam flocculated by salt, “pseudosand” (Schilstra 1962). There is little doubt that by far the greater part of these components has been locally derived, from wind erosion of the dry surfaces of basins and levees. Some is undoubtedly trapped as it moves by marshes and lakes, as Lees and Falcon indicate, but the observational evidence summarized in chapter 2 strongly suggests that wind deposition takes place on virtually as general a scale as wind erosion. Hence the action of the wind is better considered as another of the diverse forces that act not to concentrate riverine sediments or their derivatives in a few loci but to disperse them very widely.

There can be no doubt that soil deposits stemming ultimately from Tigris and Euphrates river sediments vary tremendously in rate of accumulation across the alluvium. Depths of virgin soil underlying canal levee or occupational deposits of as much as 7, 8, and even 10 meters below adjacent plain level have been recorded east of Baghdad, of well in excess of 5 meters at ancient Isin, and of 6 meters below the great mound of Warka in the south (Adams and Nissen 1972, p. 6; Hrouda 1977, pp. 19–20, 147). Those measurements are compromised, to be sure, by uncertainty as to how much the “adjacent plain” level may have been elevated by slope runoff from the mound or levee in question, and by perhaps still greater uncertainty as to how much subsidence may have occurred owing to the weight of the mound or levee on

waterlogged soil (Adams 1965, p. 9; Adams and Nissen 1972, p. 6). For much more modest and recent Indian mounds in the lower Mississippi valley it has been found that their “central part commonly sinks to a depth of up to two or three feet below its margins. In most cases the margins themselves have subsided” (Russell 1967, p. 18). But whatever the exaggeration in the recorded depths referred to earlier, surely even greater depths of deposit have accumulated over the same period along the major river levees.

In at least some formerly settled and cultivated areas that now are desert, on the other hand, there appears to have been a substantial net lowering through erosion of the land surface that obtained at the end of the third millennium B.C. There is no other obvious explanation for graves in ancient cemeteries being exposed above contemporary plain level by wind erosion. Similarly, the hundreds of small, low prehistoric sites that are reported on in this study and elsewhere cannot all represent high mounds of which only the summits have somehow been left uniformly exposed above a deep blanket of later alluvium. Perhaps even more significant in this respect are the extensive traces of third and fourth millennium watercourses that can still be easily followed both on the ground and in the air photographs. At least in uncultivated areas that have been heavily exposed to wind erosion during the last millennium or so, it thus appears that much of the net increment from several millennia of earlier alluviation has been removed and transformed into dunes.

Impressionistic as much of it is, the available evidence makes it seem likely that the heaviest net increment, as well as current rate, of deposition occurs not in swamps in the south but at the northern end of the alluvial plain. Taking into account the randomizing or at least dispersive effects over time of the widespread and changing distribution of irrigation waters, of aeolian erosion and redeposition, and of the periodic movements of the river channels, the area in which some deposition has occurred during the past six thousand years must be nearly as large as the alluvial plain itself. Hence it may be useful to employ the figures on silt load given by Lees and Falcon not as an argument for tectonic rejuvenation of limited areas of swamp, but as a basis for calculating average deposition over a much larger area of 60,000 square kilometers or so that constituted the core of the alluvium.<sup>4</sup>

This average is  $3.59 \times 10^{-4}$  meters per year, or less than 2.2 meters in aggregate for a six-thousand-year period. Taking into account the more extensive deposition on the upper end of the alluvium, probably extending along the Euphrates to somewhat below Babylon, we have reason to expect considerably less than even this comparatively modest overburden in the heart of ancient Sumer where this study is concentrated.<sup>5</sup>

Lees and Falcon took the important step of casting

archaeologists and historical geographers loose from an earlier, complacent mooring to the assumption of long-term tectonic stability. They maintained that we had to reckon with a concatenation of unstable forces, a geosyncline that did not necessarily remain conveniently in place as other changes accumulated in and around it. The same perspective can be extended from the depths of the alluvium to its surface, to the plain that to the casual observer appears to be perhaps uniformly rising through alluviation but otherwise subject only to a random drift of dunes and other insignificant, localized changes.

Appearances to the contrary, the dynamism of the plain is concealed in this microtopography. Boundaries of levees and basins shift, and with them shift the local rate and character of sedimentation. River courses not only build up levees but periodically break away from them; that is the only way the plain can remain a plain. Wind erosion works on exposed or abandoned levees, sculpturing them into tiny buttes and turning the unconsolidated mass that it loosens not simply into dunes that drift harmlessly across the desert surface, but into an extraordinarily powerful abrasive agent. Alluviation and wind deposition continue irregularly and inconstantly over a wide area, intricately interwoven with erosive forces to produce a shifting local outcome that defies easy generalization. Yet all these processes of change fortunately take regular forms. Traces of ancient watercourses and levees are recognizable as such, even when the great mass of the sediments originally embodied in them has been eroded away. The barren desert, seemingly variable only in superficial detail, is in fact a palimpsest on which the repeated, profound modifications that have characterized its development can be disentangled and read.

#### LOCAL CLIMATE AND VEGETATION

Thus far I have dealt with the Euphrates as the primary determinant of a successful human occupation of the lower Mesopotamian plain that was essentially agricultural, and I have described the terrain—in the absence of Euphrates flooding or irrigation supplies—as a desert. While not incorrect in a very generalized description, these characterizations must be qualified in several important respects. To begin with, they fail to take cognizance of the pastoral, either non- or only semisedentary aspects of Mesopotamian subsistence in all periods. The maintenance of large herds, principally of sheep and goats, cannot be understood without reference to pasturage available for much of the year in immense semiarid and even desert tracts that were not in use by cultivators. Meat and dairy products from those herds may not have been an absolutely vital source of proteins and other nutrients in most circumstances, in view of the fairly general availability of fish. But, without the wool for textiles to be traded for natural resources that were

wholly lacking in the alluvium, it is difficult to believe that Mesopotamian civilization could have arisen as early and flourished as prodigiously as it did. And at least equally important was the aspect of herds as a food resource that could be held in reserve, not subject to the same set of natural hazards as the crops, and capable of being moved from one location to another. From this perspective, pastoralism was intimately linked in many ways with sedentary and even urban pursuits, and it repeatedly served as the indispensable source of ecological flexibility and resilience in the aftermath of natural or socially induced disasters (Adams 1975*d*).

Hence the climate of the lower plain must also be considered here as a factor influencing settlement and land use, if to a less significant extent than the land and the irrigation water supplied by the Euphrates. As summarized by Guest (1966, pp. 17–18), its general features include high mean annual air temperature, large diurnal and annual ranges of temperature, low atmospheric humidity, and scanty, extremely variable rainfall that is concentrated in the winter and spring. Rain is virtually absent from late May through early October, and the long, searing summer is the dominant season. The comparatively short, cool winter extends from December through February and is also well marked. Frosts occur periodically, especially during January, and prevailing low temperatures at that time slow or may even completely interrupt plant growth so that the normal winter crops as well as natural vegetation are unable to make full use of the rains. Except where there is flooding or irrigation, therefore, the conditions for plant life are “most rigorous.” As Guest goes on to observe,

little growth can be made until the short spring season—just as the rains are beginning to cease. During the long summer months there is no surface water available, while the intense heat and dryness of the air create conditions of extreme desiccation. Thus the only plants able to survive in the lower plains of Iraq are the ephemeral annuals (which can rapidly complete their life cycle in the spring and then lie dormant in the form of seeds for the remainder of the year) or such deep-rooted and highly xerophytic perennials as are sufficiently protected to withstand the rigours of the summer while drawing on underground sources of water. This is reflected in the paucity of plant species over the greater part of Lower Iraq, since only a limited number of species come within the two above categories. [Guest 1966, pp. 20–21]

Table 1 amplifies and quantifies the somewhat impressionistic account of seasonal climatic variation that was given above. It has been based on meteorological observations recorded at stations immediately west, east, and southeast of the area primarily covered by this study—at Diwaniya, Hai, and Nasiriya, respectively—in order to reflect conditions within that area as accurately

# Water, Land, and Life

TABLE 1 Climatic Data from Three Stations in South Central Iraq

Month	Temperature (°C)				Mean Relative Humidity, 3 P.M.	Precipitation (mm)								
	Monthly Mean (all stations)					Diwaniya (1929–58)			Hai (1941–58)			Nasiriya (1941–58)		
	Min.	6 A.M.	3 P.M.	Max.		Min.	Mean	Max.	Min.	Mean	Max.	Min.	Mean	Max.
January	–8.3	6.2	16.3	26.6	47.7	Tr. <sup>a</sup>	19.0	60.0	1.2	22.0	77.2	Tr.	17.0	39.0
February	–7.2	7.9	18.5	32.2	40.3	—	18.3	69.5	Tr.	22.0	53.9	Tr.	13.1	48.5
March	–2.2	11.2	22.8	36.1	35.7	Tr.	16.0	101.5	Tr.	25.9	78.7	Tr.	21.1	85.7
April	1.6	16.4	29.3	42.8	28.3	—	15.3	64.4	Tr.	12.1	60.9	Tr.	15.5	66.0
May	7.8	22.4	35.7	46.1	21.3	—	11.6	113.6	—	6.8	29.4	—	6.0	46.8
June	14.4	25.7	39.7	49.5	18.0	—	0.2	5.3	—	Tr.	0.3	—	—	Tr.
July	18.3	26.7	42.3	50.0	17.3	—	0.1	3.7	—	—	—	—	—	Tr.
August	16.1	25.9	43.0	49.4	16.0	—	—	—	—	—	—	—	—	Tr.
September	11.6	22.5	40.2	48.9	16.0	—	—	Tr.	—	—	Tr.	—	—	Tr.
October	2.8	17.5	34.2	43.9	22.3	—	0.8	3.8	—	1.3	10.6	—	1.4	10.8
November	–2.8	12.6	25.2	37.2	36.7	—	15.1	64.2	—	20.4	70.6	—	22.7	69.8
December	–5.6	7.8	17.9	28.9	51.7	0.1	23.8	60.6	4.9	30.7	73.8	5.3	28.2	68.9
Water = year (Oct.–Sept.) precipitation totals						57.6	112.1	179.5	62.5	136.6	221.0	33.5	120.9	249.3

Sources: Ministry of Economics 1958; Hydrological Survey of Iraq 1959.

<sup>a</sup> Tr. = Trace

as possible. The monthly averages given for temperature and humidity are calculated from the averages for all recorded years at all three stations. There is obviously high seasonal as well as diurnal variability, although possibly it is only the occasional killing frosts between December and February that would have substantially interfered with the agricultural cycle. Attention may also be called to the importance of increasing humidity beginning in October and continuing through the fall. Initial plowing and seeding often is delayed until the soil softens as it takes on hygroscopic moisture from the air (Russel 1957).

Two features of the precipitation statistics recorded in table 1 particularly deserve attention. The first is that the amount of rainfall is, with rare exceptions, quite inadequate to produce a winter crop and is better regarded as only an occasional supplement to irrigation. If 200 millimeters of precipitation during the major growing cycle from October through April is regarded as the absolute minimum for dry farming, that "water-year" figure was reached only three times in the sixty-six aggregate years of recording at the three stations. Moreover, it is misleading to deal with precipitation in terms of aggregates. Its distribution at crucial intervals during the growing cycle is at least equally important. As noted above, heavy rains concentrated in January may do little to promote growth if prevailing temperatures are low enough to approach the critical level of 10° centigrade (50° F). Heavy rains after March, on the other hand, come too late to influence the size of the grain harvest. When these circumstances are taken into account it must

be said that crop production without irrigation is virtually never possible, except in rare instances at restricted localities where runoff from a larger area can be concentrated on a particular field.

The second characteristic of precipitation is its enormous variability. Heavy showers can be expected at any time from November through much of May, but they may not occur before December or even January and may be almost completely suspended for as much as two or three months during the growing cycle. This again reinforces the dependence of agriculture upon irrigation, since the Euphrates, for all the variability of flow we have seen, is vastly more dependable as a water source. At the same time, rain introduces a speculative element that affects both the size of the cultivated area and the aggregate output. Particularly if there is heavy early-season precipitation, farmers may be inclined to quickly enlarge the area they have planted, since high levels of residual soil moisture may permit a crop with less irrigation than is customarily necessary.

There are obvious difficulties in seeking to generalize about the historic and prehistoric past from climatic conditions obtaining today. It is certainly correct, as has recently been observed, "that the evidence available to us is far too limited in its scope and quantity to support any generalizations or far-reaching conclusions" (Oates and Oates 1977, p. 115). Yet it must also be said that nothing yet available in the palynological, geomorphological, or archaeological record suggests that the climate of the region since the Pleistocene was for a time sufficiently wetter to permit sustained, significant dry agri-

culture on the alluvial plains, except possibly for a near-piedmont band along the foot of the Zagros. Hence it seems incontestable that agriculture was introduced into lower Mesopotamia only on the basis of irrigation and that the region has remained a classic example of irrigation agriculture ever since. That does not mean, however, that possible climatic variations would have had only insignificant effects upon human life there. In the first place, shifts in the volume or periodicity of rainfall surely would have been sufficient to have at least marginal effects upon agricultural productivity. Particularly in circumstances where the food requirements of a population and the available irrigation supplies were approximately in balance, such shifts might decisively tip the balance one way or the other. Additionally, attention has been called above to the potentially critical factor of January temperatures. A climatic oscillation that led to a depression of those temperatures would interrupt the growing cycle and therefore delay it for a longer period, undoubtedly with adverse effects upon productivity.

But far more important would have been the effects of even slight climatic shifts upon the pastoral component of society and subsistence. We shall see in chapter 2 that variations in precipitation even during the eight-year period of field reconnaissance have led to pronounced changes in desert vegetation, and there is every reason to believe that far greater oscillations occurred repeatedly throughout the ancient past. Most of them, to be sure, probably involved localized shifts in the availability of pasturage rather than dramatic advances or declines in the carrying capacity of the alluvium as a whole. Some impression of the frequency and character of such shifts can be gained from figure 2. Based on a succession of eighteen "water-years" at the same three stations whose records provide the data for table 1, it distinguishes the highest and lowest thirds in the range of annual precipitation totals at each station and plots their years of occurrence. In about half these cases it appears that trends were fairly widespread; lows occurred simultaneously in 1942,

1944, and 1952, and highs in 1945, 1955, and 1957. Presumably these were times when little was to be gained by moving herds in search of better pasturage. On the other hand, there were also years like 1951 and 1956, in which low precipitation was reported at two of the stations and high precipitation at the third. Clearly, these were times when some movement would have been advantageous for herds and herdsmen not fixed in place by permanent fields and dwellings. Perhaps even more important than the relatively rapid oscillations and ensuing shifts were successions of several years in which abnormally high or low precipitation occurred in one or more regions. Around Diwaniya, for example, a lengthy period of low rainfall in the late forties and early fifties would have led to a progressive denudation of the fodder available for flocks on the open desert, while the unusually high rainfall of the late fifties would have had the opposite effect.

What is historically crucial about variations in precipitation like these, whether major and long-term or minor and brief, is that they bind the pastoral components of Mesopotamia to a set of ecological constraints somewhat different from those affecting the cultivator. Hence mobility remains an important advantage for the former, while, in the absence of herds, the latter would have much to gain by investing cumulatively in the improvement of his land. However, we must also bear in mind that cultivating and herding are normally carried on simultaneously, within the same agricultural communities and often by the same families. As noted earlier, there are reciprocities in labor and subsistence that strongly encourage this diversity. It could well be, therefore, that climatic variability has also had a profound but indirect effect on historic patterns of cultivation. It appears to have reinforced other natural factors such as salinization in acting to retard capital investment in agricultural improvements and to favor the retention of an extensive system based on alternate years in fallow.

Given the omnipresent fact of climatic variability, it follows that extensive overgrazing must occur almost ev-

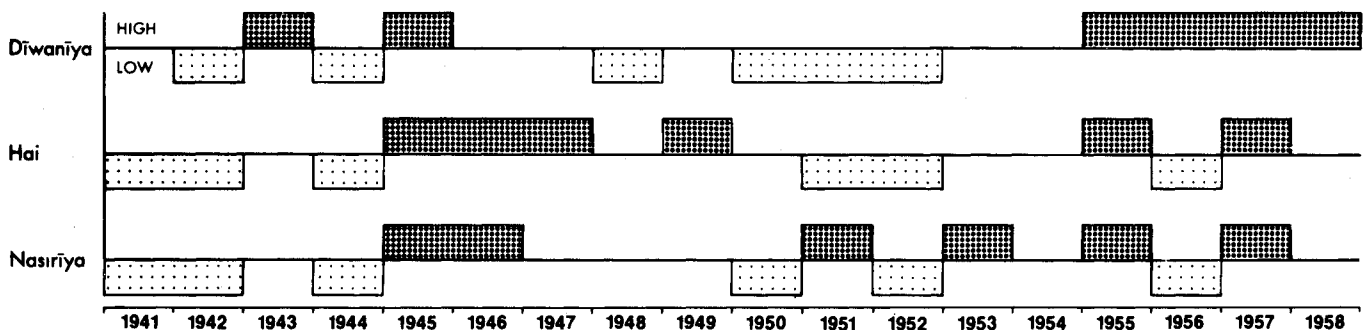


Fig. 2. Periodicity in high and low precipitation at three stations in South Central Iraq (for "water-years" beginning the preceding October). From Hydrological Survey of Iraq 1959.



everywhere with great frequency, even if flocks and the supply of natural vegetation remain aggregatively in rough balance across the region as a whole. To this destructive force must be added the more selective activities of the fuel-gatherers, in this case aimed not at the ephemeral annuals but solely at the woody perennials. The effect, as Guest has noted, is a massive removal of perennial herbs and shrubs,

leaving in many places but few relics of the perennials: the least palatable, the toughest and the most heavily-armed species. It is only in the more remote or protected places that we can get an idea of the form the vegetation would have assumed if it had not been interfered with. . . . In some parts of the plain there are large or small strips and patches of vegetation which may appear to be natural but are in reality of secondary origin—still largely influenced by the agricultural history of the district, the proximity of adjacent habitations and pastoral activities. [Guest 1966, p. 66]

Following Zohary, Guest accepts a definition of desert that is arbitrary in the sense that it is based on extent of plant coverage rather than on the occurrence of distinctive types of vegetation. Plant communities of the desert are said to be “open, often scattered, and usually more or less restricted to favourable habitats,” while those of the steppe are closed and cover the greater part of the land surface, at least at certain seasons. In these terms, the un-irrigated terrain that was the special focus of this study is perhaps best described as sub- or semidesert. Large, completely barren tracts do occur in some areas, as I will note again in chapter 2. In most cases, however, they are either the secondary products of overgrazing and excessive fuel-gathering or are caused by soil salinity or topographic factors. “Broadly speaking the check to grazing throughout the year is not lack of vegetation, except locally in areas of edaphic or secondary desert, but lack of water points at which the animals may drink during the long dry summer season” (Guest 1966, pp. 68–69). Finally we turn to the characteristic plant communities themselves, relying once again on Guest’s authoritative study:

The typical natural vegetation of the sub-desert consists of more or less scattered perennial shrublets (e.g. *Haloxylon salicornicum*, *Artemisia herba-alba*, *Achilles fragrantissima*, *Rhanterium epapposum*, etc.)—practically nowhere completely closed and often very open, and including barren tracts of edaphic desert and secondary desert. In spring the open spaces between the bushes are generally occupied by a relatively sparse crop of annuals. In depressions and other favourable habitats the coverage of vegetation may approach 70% or more, while after a wet winter the herbage between the bushes may become almost luxuriant during its short-lived spring growing and flowering season. Where the bushy perennials have been destroyed the

sparse ground vegetation is usually dominated by *Stipa capensis*, this being everywhere a sign of degradation. [Guest 1966, p. 71]

#### AN OVERVIEW OF MAJOR WATERCOURSE SUCCESSION PATTERNS

In arguing that older archaeological theorizing about the advance of the alluvium at the head of the Arabo-Persian Gulf was oversimplified, Lees and Falcon were suitably cautious in advocating an alternative reconstruction of its position. Yet, though it still remains obscure, the position of the Gulf shoreline is fundamental if we are to describe in basic outline the succession of rivers and landforms that have characterized the Mesopotamian plain. Hence their interpretation remains an appropriate point of departure:

The Tigris, Euphrates and Karun rivers are not building forward a normal delta; they are discharging their load of sediment into a tectonic basin which is the successor to a geosyncline in which many thousands of feet of sediment have been accumulated in the past, over a period to be measured in hundreds of millions of years. The balance between subsidence and sedimentation in the recent past seems to have been finely poised; subsidence was episodic and in the intervals the depressions tended to fill up with sediment. But in general subsidence has been dominant, with the exception of some minor local uplifts representing a late movement of anticlinal structures. . . .

We hesitate to suggest a position for the head of the Persian Gulf at the time of the Flood which gave rise to the Babylonian legend, for it is equally impossible to hazard a guess at the date or the extent of this event. There is no acceptable historical evidence that the head of the Gulf was ever very far up-country from its present position, and the evidence which we have collected suggests on the contrary a complex pattern of advance and retreat of the sea; precise dating is not yet possible. Subsidence of the Gulf bottom combined with a rise of the sea-level may even have buried the remains of many cities below river-borne sediment or below the waters of the Persian Gulf. [Lees and Falcon 1952, pp. 38–39]

More recently, considerable doubt has been cast not only on the extent of tectonic instability that Lees and Falcon hypothesized but on the necessity of invoking tectonism as even a partial explanation for any of the phenomena they reported. Early critics of their thesis were somewhat offhandedly dismissed as “far from adequately equipped to engage in geological battle” (Mitchell 1958, p. 127), but much of their supporting evidence has now been shown to be consistent with a variety of interpretations other than the one they offered (e.g., Kirkby 1977, p. 283). Continuous submarine terrace formations have been traced that seem to preclude any major tectonic movement since at least late prehistoric times. Their attribution of



raised marine terraces and drowned valleys to tectonic changes has likewise been questioned, on the grounds that it fails to take into account more recently accumulating evidence of climatic change and consequent oscillations in Holocene as well as Pleistocene sea levels.<sup>6</sup> "Above all, alluviation and stream incision, not to mention drowned irrigation systems, do not in themselves indicate recent tectonism. Instead such physical changes point to variations of environmental interrelationships far more complex than originally anticipated" (Larsen 1975, p. 56). Thus the case is today being argued with renewed vigor that since the fourth millennium B.C. the shoreline at the head of the Gulf has advanced a minimum of 150 to 180 kilometers (Larsen 1975, p. 53).

This is not to imply that the issue is by any means settled. Turning from primarily geological considerations, the argument by Lees and Falcon that "there is no acceptable historical evidence that the head of the Gulf was ever very far up country from its present position" also remains in sharp contention. Implicit in Sidney Smith's reply to their article was the complaint that disproportionately higher standards of certainty were asked of historical documents than of the unsystematic and geographically scattered geological data that were fitted together in support of what remained a fairly speculative hypothesis. The consensus of those familiar with the cuneiform textual evidence, as he then stated it, was that "there was a continual recession of the head of the Gulf from the earliest times onward" (Smith 1954, p. 396). Yet the nature of the information was such that the tectonic argument could not be completely controverted; no locations along the ancient shoreline at properly specified times and places were ever attested.

How has the situation changed with regard to the earlier historical periods during the quarter-century or so since the tectonic hypothesis first was formulated? We knew then that some of the older Sumerian towns like Ur and Lagash were in fairly close but tantalizingly unspecified proximity to the sea; that remains the case. The number of excavations in lower Iraq has of course grown since their paper was published, but none has been conducted on the lonely *ishans* rising out of the swamps in the great empty area east and southeast of Ur and Lagash. That is the area that presumably would have been available for early settlement if the shoreline has not advanced to its present position but has merely shifted back and forth in the same general vicinity. None of the extensive, increasingly systematic surveys of lowland Iraq had been undertaken at the time Lees and Falcon wrote; but then it must be added that none has even yet ventured into the region east of the Shatt al-Gharraf that is crucial for this question. Such more limited reconnaissance as has been accomplished, however, has failed to produce any evidence of ancient settlement north of the Haur al-Hammar. Even on the alluvial margins to the south of this great depres-

sion the only settlements yet recorded are mainly of Islamic date and apparently in no case earlier than the mid-second millennium B.C.<sup>7</sup>

Later as well as earlier periods provide contributions to the continuing discussion. The most recent reaffirmation of the position of Lees and Falcon is based largely on Hellenistic sources. Proceeding from the firm identification of Failaka Island as the site named Icarus by Alexander by way of increasingly problematical ancient measures of sailing distances, it has been argued that there is very little evidence of change in the limits of the delta over the past twenty-four hundred years (Hansman 1978, p. 60). However, the more convincing part of this case appears to apply only to the extreme western part of the delta, where at any rate active deposition of sediment had slowed or even ended earlier. And certainly the Islamic evidence is unequivocal in placing Abadan on an island facing the open sea at the mouth of a very wide Tigris estuary extending inland as far as modern Basra, indicating an advance of some 60 kilometers in at least the central portion of the delta shoreline over the course of a millennium or so (Le Strange 1895, pp. 302, 306). Of course, the possibility remains open that this was the consequence of a transitory phase of subsidence. Even for rather recent historical periods, therefore, relatively little progress appears to have been made in delineating the sequence of changes in the position of the shoreline as a key to the importance of tectonism as the underlying geological process.

There is one further development that may be of some significance. The Iraqi Directorate General of Antiquities has grown from a small organization with a handful of trained inspectors to a major institution with many competent specialists. Chapter 2 will show that inspectors' field reports in the files of the directorate, necessarily combining older and newer records, are variable in quality. But the extent of coverage has increased progressively, and in that sense it has become progressively harder to believe that there could be substantial early remains in the southern swamps that have simply gone unrecognized. Apart from field inspections, moreover, there has been a vigorous, ongoing program of acquisitions of archaeological specimens by purchase from local informants, and that also has yielded nothing suggesting early settlement in the area in question. Without claiming that evidence is in any way conclusive (particularly with regard to the possibility of small, ephemeral sites), therefore, there is an increasing likelihood that below the kingdoms of Lagash and Ur lay a major hiatus of early settlement continuing well into the second millennium that is consistent with the presence of a Gulf shoreline.

Two countervailing considerations may be raised against what is admittedly a very tentative line of reasoning. The first is that, if Lees and Falcon are correct in their conjecture that the highest sedimentation rate occurs in

the lakes and swamps of the south, early sites in this region may indeed all be very deeply buried. My contrary arguments have been given earlier, but the lack of a more affirmative resolution of the question only underscores how little concrete information is available on the nature and rate of ongoing geomorphic processes. Second, even a total hiatus of settlement does not necessarily imply an open arm of the Arabo-Persian Gulf. We may have to deal in the past, as to a lesser extent we still do today, not with a well-defined shoreline but with a progression of swamps and more and more open, more brackish or saline lagoons. Such is a possible implication of Sumerian fish nomenclature, which distinguishes not only freshwater from salt-water species, but also brackish-water varieties, each with their correspondingly specialized groups of fishermen (Deimel 1931, pp. 98–99; Salonen 1970, pp. 31–50, 239–42). This possibility is even more difficult to set aside convincingly, although the presence of small settlements throughout the swamps today suggests that nothing short of open water would account for a seemingly total hiatus of settlement in the past. But here, for the present, at least the archaeological side of the question must continue to rest—in a position not greatly different from that of a generation ago. The old, simplistic assumptions about alluviation as the only significant process have been expunged by the work of Lees and Falcon and others who have followed them. Now we are confronted instead with a maze of alternate possibilities, among which the available evidence does not yet permit a clear-cut choice.

Geomorphological progress of a more unambiguous, heartening kind has meanwhile been made at the upper, northern end of the alluvium. Detailed studies in the vicinity of ancient Sippar and Tell al-Dayr have been directed toward relic systems of natural drainage in the area that apparently follow the former channels of ancient watercourses. Two that run essentially parallel with the Euphrates are now thought to represent older courses of that river, stages in its irregular westward movement to a modern position at the extreme western edge of the alluvium (Paepe 1971). This highly plausible reconstruction is consistent with the synoptic view of Euphrates evolution that will shortly be developed here, from an essentially different body of data. More radical is the further analysis of a perpendicular gully system that flows past Tell al-Dayr to join these ancient Euphrates channels near Sippar. Cautioning that his data are as yet insufficient for proof, Paepe suggests that this seems to represent a former Tigris course and hence to document a primary Tigris-Euphrates junction in the vicinity of Sippar. Citing evidence derived from my own surveys in Akkad, he then argues also for an apparently somewhat later stage in which the Tigris followed a more or less independent course southeast, roughly parallel with the present position of that river but about 30 kilometers to the south. Other than obviously assuming that all of these stages or events are Holo-

cene rather than earlier, Paepe does not assign provisional dates to them.

Although again resting on entirely different bodies of data, our findings once more coincide fairly closely. What can be added here stems from more recent reconnaissance farther downstream along the line whose significance Paepe correctly perceived, which for various reasons detailed in chapter 2 could not be initiated until a dozen years after the initial reconnaissance or completed before 1975. Along the southern fringes of the modern Haur Dalmaj in an area that has been outside the frontiers of cultivation since classical Islamic times, the powerful meanders of a major watercourse have been extensively exposed by wind erosion. As is detailed more fully below in chapter 3, the adjacent settlements and sequence of overlying canal levees make it clear that the important and fairly long-lived river course had begun to decline in use by the end of the Early Uruk period and had been permanently abandoned by no later than the end of the fourth millennium B.C. This course appears to be a direct continuation of the line whose upstream portion Paepe provisionally identifies as the Tigris, and it can be followed 75 kilometers farther southeast until it disappears under the sediments of the modern Shatt al-Gharraf. In so doing, it passes within 30 kilometers of Nippur and 40 kilometers of Adab, both ancient towns whose later historic associations with the Euphrates are close and absolutely unmistakable. If this is indeed the channel of the fourth-millennium Tigris, then the riverine sequence here tends to confirm Paepe's hypothesis that the cumulative effect of Euphrates flooding was progressively to force the Tigris into more and more easterly beds. But there is also an alternate hypothesis—that this represents only the earliest and easternmost of a series of Euphrates beds that have moved progressively westward. Is further evidence available with which to make at least a tentative choice between the two?

Here we must return to the regularities of meander geometry that were adumbrated earlier. The quantitative terms of the relationship may vary somewhat in different settings, but meander wavelength is closely proportional to stream discharge. The meanders of this ancient watercourse can be clearly plotted in several instances and hence can be compared with modern Tigris and Euphrates meanders. The point is not to estimate the discharge of the ancient stream in absolute terms; there are, in any case, ambiguities in the concept of discharge as it applies to meander geometry that would make this very difficult. But the proportionality of the meanders alone provides a strong if not entirely unequivocal indication of the source of the water.

Meander wavelengths on the Euphrates, taken from the vicinity of Falluja to minimize the effects of depletions for irrigation that might not have a fourth millennium equivalent, average about 7.5 kilometers. Tigris meander wave-

lengths below Baghdad are more variable; a few exceed 20 kilometers in length, but the majority clearly fall within the range of 8 to 12 kilometers. Meander wavelengths on the ancient channel north of Nippur also vary, with a few approaching the upper figures for the Tigris, but the average is approximately 7 kilometers (see fig. 3).

The interpretation that initially may seem to follow from these figures is that the meanders and hence volume of flow of the ancient watercourse are essentially identical with those of the Euphrates. However, that interpretation neglects the fact that several other channels of the Euphrates are known to have been carrying a substantial flow during the Early Uruk period. Apart from the possibility that at least some water was reaching the western part of the alluvium, under the heavy silts laid down by the modern Euphrates, the channel in question could not possibly have served any of the important towns—not to speak of scores of villages—in the regions around Nippur, Uruk, and Eridu. Accordingly, the conclusion seems inescapable that the ancient channel could not have taken the form it did without a substantial admixture of Tigris water. Since it is perceptibly smaller than the single, modern channel

of the Tigris, on the other hand, we cannot identify it as the equivalent of the whole of that river but only as one of its branches.

The lower end of this course, it may be noted, has a tantalizing but inconclusive bearing on our earlier discussion of the position of the shoreline of the Arabo-Persian Gulf. A marked change in the character of the channel strongly suggests that it must have entered a large body of water near the western edge of the modern zone of cultivation dependent upon the Shatt al-Gharraf (see below, pp. 31, 62). But investigations of a different and much more detailed kind will be needed to ascertain whether seawater, as opposed to fresh or brackish swamps or lagoons, could have extended this far inland as late as the mid-fourth millennium or even slightly later.

Drawing the threads of this discussion together, it appears that a strikingly different general arrangement of watercourses existed at the time human settlements first became widespread in the early fourth millennium. The Tigris and Euphrates did not remain distinct, as they do today, but were joined near the head of the alluvium. At that point, however, they did not form a single united

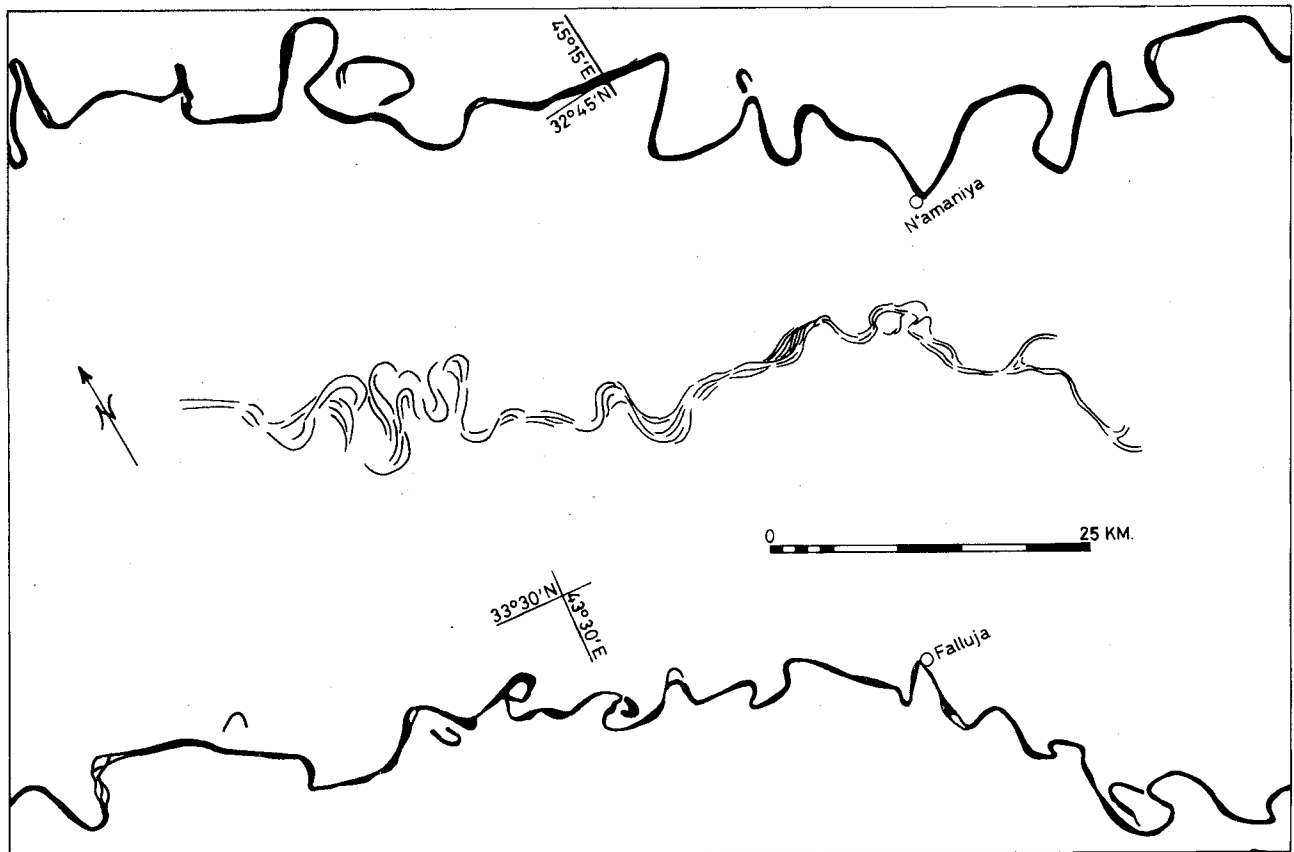


Fig. 3. Contemporary Tigris and Euphrates meanders compared with ancient meander traces.

stream comparable to the Shatt al-Arab at the foot of the modern alluvium. Instead, they diverged once more into an uncertain but probably considerable number of channels that together may have constituted a shifting, bifurcating, and rejoining combination of an anastomosing pattern and an alluvial fan as they crossed the lower Mesopotamian plain toward a number of separate points of outflow into the Gulf.

• After the fourth millennium the Tigris passes largely out of our ken for an extended period. Diverted farther eastward by the buildup of Euphrates sediments, it may have shifted abruptly into its modern, single-channel form in approximately its present position. A course even farther to the northeast is also possible, followed by a reverse movement into its present position as sediments from the Diyala alluvial fan accumulated that would divert it southward once more (cf. Adams 1965, figs. 2–4). Still a third alternative is that it followed a number of braided or intersecting channels in the broad band separating the first two possibilities that have been suggested. In any event, the relatively more manageable regime that must account for the density of Early Uruk settlement in the area north of Nippur, presumably involving a channel on an elevated levee, apparently obtained no longer. Aside from a handful of towns identified with the Tigris and sporadic efforts to bring feeder canals from it into the heart of Sumer, the Tigris is not a significant factor again for almost three millennia.

The theme of this brief overview henceforth is the sporadic but continuing and cumulative westward movement of the Euphrates. If we assume that the Early Uruk channel north of Nippur was a branch of the combined Tigris and Euphrates rather than of the Tigris alone, then that represents the easternmost point in the sequence insofar as we can at present trace it through associated archaeological materials. And the abandonment of that branch is then also the first step in the long westward sequence.

There are suggestions of not less than two and probably three other channels that were coeval with this one, not to speak of shorter branches or connecting links between them. Almost certainly there were one or more others still farther to the west, of which little may ever be known because of the massive later sediments overlying them. Unlike the first channel, however, the others of which we have definite knowledge remained at least intermittently in use for four millennia longer—until the whole of the region through which they run was permanently abandoned as part of the decline of the 'Abbasid Caliphate.

As the sequence of maps in the following chapters that illustrate these courses makes clear, sinuities and meanders suggesting a prevailingly natural regime were increasingly confined to limited portions of these channels. Probably we should assume that natural, uncontrolled conditions prevailed during periods of political upheaval

and of demographic decline, and it is apparent that in some areas little or no effort was made at any time to impose another regime more conducive to intensive settlement and irrigation agriculture. But by no later than the end of the third millennium B.C., and already by the beginning of that millennium in some regions, the mode of maintenance along the greater part of these channels was essentially canalized and artificial. Increasingly it was human effort, rather than any predisposition of the Euphrates to maintain its channels in a stable, natural equilibrium, that accounts for their remaining open as important water arteries for so long.

The increasingly artificial, canalized character of these watercourses was punctuated by a relatively much more sudden and decisive shift during the earlier half of the second millennium B.C. Surface reconnaissance provides data with little chronological precision, but there appears to have been a fairly abrupt diminution of flow either at the end of the Isin-Larsa period or during the Old Babylonian period that followed. What persisted after this crisis, or perhaps were rebuilt after an interval of general social and economic collapse, were canals following the crests of the old levees but with much more limited carrying capacity. And since sediment carrying capacity is proportional to cross-sectional area, this implies that the work of maintenance involved in keeping them open must have increased proportionately.

There is a decisive westward shift in the center of gravity of the canal and settlement patterns for the ensuing Cassite period. A reasonable although still tentative explanation for the earlier crisis, therefore, is that the bulk of the Euphrates flow had shifted westward during the interim. This is surely related somehow to the contemporaneous rise of Babylon, both as a demographic center of concentration and as the political capital. A planned diversion of a greater part of the Euphrates flow into its more westerly branches, directly downstream from Babylon and hence more subject to its control, might even have been a central aspect of Babylonian politicomilitary strategy. But the conscious intervention of some human agency need not have played a decisive part, as the parallel case of the shift from the Hilla to the Hindiya channel in the nineteenth century A.D. demonstrates. Arrested only by the erection of a barrage and control works at Hindiya, a massive diversion of flow into the more westerly channel had earlier forced widespread abandonment of cultivated lands in the Hilla and Diwaniya regions (Longrigg 1925, p. 311; Gibson 1972, pp. 26–29). And though this disastrous diversion may have taken the form of an earlier canal that gradually began to run out of control, the cumulative westward movement of the Euphrates continuing over many millennia suggests that no undue importance should be attached to the specific actions or events that triggered individual shifts within that process.

There need not have been any substantial human factor in the westward movement during the Old Babylonian period. If there were one, this might as easily reflect the growing incapacity of the First Dynasty of Babylon to take preventive action during its later years as a conscious assertion of strength during its ascendancy.

The course or courses that became dominant during the later Old Babylonian period must have been well to the west of those that predominated earlier. Known ancient towns like Borsippa, Dilbat, and Marad, in addition to Babylon, presumably were situated on or close to the new or newly enlarged branches, and the positions of these centers suggest that no less than two branches were in use. But at present they cannot be more accurately located or described, nor do we know what further shifts may have occurred before the Euphrates came to occupy its modern beds. It is clear that the Shatt al-Hilla, the more easterly of the two main branches today, follows a course crosscutting and overlying the remains of Parthian and Sasanian canal levees (see below, pp. 209–10), so that its present conformation is quite recent. But knowledge of archaeological sites in this heavily alluviated terrain is too limited to encourage speculation as to what those levees may overlie in their turn.<sup>8</sup>

What can be seen, in sum, are two complementary shifts in the distribution of water over the plain. The first involved atrophy of the fanlike network of natural channels that apparently had its apex in an early junction of the Tigris and Euphrates near Sippar. Some of those channels disappeared entirely, while others diminished in volume and took on an increasingly canal-like character that involved increasing dependence on artificial maintenance. Most of the Euphrates discharge moved west, to one or more branches along the western periphery of the alluvium, where it is still found today.

The second shift was a direct corollary of the first. The old natural channels had had their origin to the north-northwest of the region with which we are dealing. Now the main body of the Euphrates had turned almost directly south, following the alluvium's western boundary. New canals became necessary, therefore, that had none of the characteristics of natural streams and could be dug and maintained only with unremitting human effort. To reduce their length, they were supplied by left-bank off-takes along the Euphrates, more nearly to the west or west-northwest than north-northwest. Over time, therefore, systems of levees grew up that crossed or intersected one another rather than taking essentially parallel directions. And the effect of those new canals, as their prevailing direction shifted from south-southeasterly to easterly, was to carry Euphrates sediments out into the center of the alluvium where the waters of the Euphrates and the Tigris had once intermingled. Gradually accumulating there, they could only reinforce the hydrological processes that

had led to the separation of the Tigris and Euphrates in the first place.

## EFFECTS OF HUMAN AGENCIES

Irrigation agriculture has appeared at several points in this account of topographic succession as little more than a surrogate for natural alluviation. It surely is, in part, a means by which riverine sediments are distributed even more widely and uniformly than by natural flooding alone. Surely also, the processes of levee formation that are set into motion by canal construction are essentially the same as those by which an aggrading stream slowly elevates its bed with the sediments it carries. Even the formation of spoil banks through the periodic desilting of canal beds may be likened to the growth of a natural levee effected by a stream as it regularly overtops its banks. And, though canals are generally excavated initially in fairly straight lines, they frequently show the same propensity as rivers to develop meandering courses over time. On air photographs or large-scale maps of southern Mesopotamia, successive reaches of individual watercourses often appear to follow a bewildering mixture of "natural" and "artificial" regimes, defying any effort to classify the whole of a particular watercourse as one or the other. Quite logically, then, the primary terminological distinction made today is one of size, *shatt* for the handful of largest rivers and canals, and *nahr* for the enormous array of smaller ones.

This might seem to suggest that the basic topography of the alluvial plain owes little to human influence. Perhaps it also seems to imply that the adaptive requirements for successful agriculture are those imposed by relatively constant natural processes and constraints, or that human occupation has merely reinforced or intensified trends that sooner or later would have been manifest anyhow. But none of these possible conclusions is in fact justified. Human agencies do not merely supplement but in part transform some of the dominant forces and forms of even the physical landscape. It is to a description of the distinctive effects of these agencies, both in subtly altering the topography and in setting new demands upon human settlement and social institutions, that we must now turn.

In relation to the unstable, continually shifting natural processes that tend to distribute water and sediments across an alluvial landscape, an agricultural civilization is a powerful countervailing force. Growing crops in fields, gardens, and orchards, with palms and other perennials, irrigation canal systems, and storage and transport facilities, all are illustrative of means of subsistence and cumulative capital investments that are placed in jeopardy by channel movement. Towns and cities must be similarly regarded, with social and symbolic incentives play-

ing an increasing part in the urge for stability. Enduring structures of social relations are mapped out in, if not generated by, tenure systems and arrangements for access, exploitation, and control of land as the primary productive resource. The effort to maintain those more or less figurative "maps" against hostile natural forces accordingly is a part of the effort to assure the continuity of the social system itself. The response to destructive changes of channel, therefore, normally is persistent, unremitting effort to reverse them once the flood is spent. To anticipate and prevent such changes, still other efforts are called forth to construct bunds and similar control works.

Much but not all of this concern is related to major disruptions in course and flow. Even localized meander cutting jeopardizes canal headgates and the orchards that normally are sited as near the banks as possible to assure the water supply. Perhaps more important, watercourses were the principal arteries for the movement of goods, including not only long-distance commerce but the transport of harvested crops into the cities from outlying estates and villages. Meandering channels are characteristically highly variable in width and have deep scour pools alternating with shoals and riffles (Gregory and Walling 1973, p. 247). These conditions seriously impede riverine movements by boat and barge and make the tasks of towmen slower, more onerous, and much more costly. For such reasons, then, efforts were directed not merely toward diking and maintaining but also toward straightening the major watercourses. Figure 32, showing the conformation of a late third millennium channel, illustrates the apparent outcome in one region south of ancient Adab.

Several effects of these activities can be traced, apart from merely the straightening and stabilizing functions that were intended. The natural system of interlaced, anastomosing networks of channels that characterized the central lower plains involved local fluctuations in flow that made water management difficult. Over time, irrigators sought to replace this with a more canalized, branching, dendritic system. Major levees were kept almost indefinitely in use, both because the traditional towns and cities were situated along them and because canals along their crests maximized command of the land along both backslopes for irrigation purposes. As they took on an increasingly artificial character, levees increased in height relative to their backslopes and adjacent depressions, and along the line of their summits there were increasingly to be found the great artificial ridges or spoil banks that had to be removed more or less annually for the canals to continue to function. Long-continued reliance on the immediate hinterlands of individual towns for the agriculture to sustain them, particularly if population growth edged the perimeter of cultivation down the levee backslopes and over the depression margins, unavoidably increased the dangers of salinization. So also did the extension, modifi-

cation, and renewal of the tails of the dendritic canal systems on which irrigation increasingly came to depend, since the levees and spoil banks associated with these smaller branches interrupted natural patterns of drainage and encouraged a rise in saline groundwater levels (Buringh 1960, pp. 153–54).

This is not to imply that salinization is to be understood exclusively as an unintended by-product of human agricultural activity. As I noted earlier, it is endemic on semiarid, subtropical alluviums where high evaporation and slow drainage gradually concentrate even the very low salt levels that are present in rivers like the Tigris and Euphrates. Traditional Mesopotamian agricultural practices, moreover, are often exquisitely adapted to confining salinity within margins that permit continuing agricultural production (Buringh 1960, pp. 249–52). But the mechanism of a fluctuating, saline groundwater table that threatened the roots of the crops went unrecognized until recently, so that the lack of systematic attention to drainage as a part of traditional agricultural methods surely intensified an already existing problem. The subsistence farmer, in addition, is typically caught between short-term uncertainties as to the adequacy of irrigation supplies to assure this year's crop and ultimate salinization of his land as the long-term consequence of overwatering (Adams 1975*d*, pp. 3–4). This is a classic bind in which overapplication of water, though hastening and intensifying the effects of salinity, all too often has been the only strategy that could be considered.

Salinization is in some respects an archetype of the consequences of human intervention mentioned previously. Short-term stability and security were sought—in stream flow, in settlement location, in movement of commodities, in basic agricultural output. Attaining at least some of these objectives may have been an indispensable precondition for urban growth and for devoting increasing surpluses to the aesthetic achievements and social differentiation and complexity that we associate with civilization. But there were attendant costs that were not at once apparent: mounting ecological fragility, reductions in the productivity of agricultural labor, and a perilously increasing dependence upon labor and capital inputs for maintaining the wider system of watercourses that could no longer be mobilized locally. The successful containment of small floods, for example, increases the danger from larger ones that cannot be contained. With growing dependence on external resources, prospects for a quick and effective response to a variety of crises are diminished if the larger sociopolitical unit is also threatened. General elevation of groundwater levels in a region, even if for a time farmers manage to adapt to it, increases the likelihood of an ultimate, general agricultural collapse. In a very real ecological sense, therefore, the seeds of abandonment lie in the development of more large-scale, labor- and capital-intensive, ostensibly better "stabilized" forms

of land use out of more flexible, extensive, seemingly "primitive" ones.

Any description in broad terms like these runs the risk of overgeneralizing. We are considering a five-thousand-year span of agricultural civilization in a substantial region, and the record is subject to important temporal fluctuations as well as to long-term, cumulative trends in development. It was also locally diverse, beneath a patina of uniformity that has largely been imposed by a prolonged interval of aridity since the latest extensive abandonment. This geographical diversity both qualifies and enriches what has been said.

The most obvious form of local variability involves the major watercourses we have been dealing with. Perusal of the maps showing patterns of settlement along them during successive periods makes clear that in most periods there are some striking discontinuities. As perhaps is best illustrated by the virtual hiatus in settlement in much of the area between ancient Nippur, Isin, and Shuruppak, some of these discontinuities remained in place more or less permanently even though textual sources support the inference from the maps that waterborne connections were maintained between the surrounding towns. Associated with these hiatuses, moreover, are well-developed meander-cutting patterns on the air photographs, suggesting that the forms of channel straightening and maintenance mentioned above were for some reason seldom attempted here.

This curious and unanticipated pattern of selective neglect is at first glance difficult to explain. Distinctive topographic or pedological features that would have precluded settlement are not apparent, and at least the instance just cited includes considerable areas of modern cultivation that argue against the existence of such features. Nor is there any apparent reason for more rapid alluviation here that would have buried older sites beneath a heavy overburden of recent sediments. Perhaps the hiatuses can best be accounted for not as neglected areas in the usual sense but as necessary parts of a larger scheme of land management and irrigation maintenance. Continuous diking and channeling of streams may have been inadvisable, on this view, since no flexible response or "safety valve" then would have been available in the event that destructive floods, or even merely excess water, began to move through the system. Accordingly, certain regions were set aside as planned, seasonally filled depressions to relieve the pressure of high water in the spring. Such a practice is attested for the time of Hammurabi, it has been argued (Klengel 1976, pp. 130–31), and there is no reason to believe it was limited to the Old Babylonian period. Intentional release of floodwaters of course would serve other purposes as well, such as to impede siege operations by an invading army. Worth noting, although probably not directly intended, is the effect such flooding would have on stimulating the growth of natural plant and ani-

mal resources. Tending to confirm the existence of extensive (or even partly permanent) swamps around ancient Isin, for example, is the relatively high frequency with which the bones of water birds are found to occur in occupational debris (and hence presumably in the diet) at that site (Hrouda 1977, p. 147). By all odds most important, however, must have been the employment of selective flooding to encourage the growth of natural fodder for the herds in uninhabited areas.

Having introduced the theme of the complementarity of cultivation and grazing patterns on a local scale, we must note its much more comprehensive application to the region as a whole. The primary settlements of at least the third millennium form a relatively dense and narrow ribbon along a series of parallel water arteries, rather than being dispersed fairly uniformly across the landscape. That is understandable, as we have seen, in terms of the greater ease of irrigation and channel maintenance it permitted. It may also reflect attempts to impose a more durable, rationalized, and hierarchical social order, since suzerainty could better be maintained over dependencies, and taxes and other forms of surplus could better be extracted from them, if they were arranged along a limited number of navigable channels. But in any case the pattern leaves open vast areas in which cultivation as well as settlement presumably must have been both much less intensive and less permanent. This appears to have been so along the right bank of the major series of channels, to the west of Nippur, Isin, Shuruppak, and Uruk, until the very end of the third millennium. It was still more strikingly so to the north well into the first millennium, where a very wide area extending from the abandoned channel of the fourth millennium all the way to the right bank of the modern Tigris and probably beyond seems to have been devoid of permanent towns or even villages.

The picture of Mesopotamian land use and settlement that emerges for at least the older periods is thus quite different from what is usually visualized. Most of the sedentary population, and virtually all of the urban development, was confined to a relatively narrow, fairly intensively cultivated green ribbon or tube down the center of the alluvium. Long-continued use of several parallel watercourses running through this tube had straightened and elevated their accompanying levees, improving conditions for irrigation along their backslopes and providing a kind of drainage away from the major concentrations of fields that would have alleviated salinization. To the sides, in both directions, lay very large regions in which much more "pristine" conditions obtained: uncontrolled runoff, seasonally filled depressions alternating with unwatered areas, swamp, semiarid steppe. Here conditions favored extractive activities like cutting firewood, hunting, digging clay for pottery, and perhaps collecting reeds. Here, preeminently, lay zones suited for specialized grazing. Later we will need to examine in more detail the degree to



which the available evidence supports this reconstruction, but it at least clarifies and synthesizes a number of unrelated characteristics of the sequence of maps of irrigation and settlement patterns.

The culmination of our sequence, at least in terms of the maximization of human influence on the character of the floodplain, saw the final transcending of the older boundary between the green tube and the steppe. In early medieval times large-scale canalization was extended to cover almost the whole of the alluvium, supporting rural population densities probably greater than those of today. Urban population, too, reached unprecedented levels. Scale, however, is not to be equated with long-term advantage or even viability. For the urban as well as lesser settlements, a largely convex rank-size distribution (see below, p. 183) argues for limited political and economic integration. Similarly, even in its greatest extension, the accompanying system of irrigation displays the weakness of the foundation on which it was built.

Its construction, for example, seems to have primarily involved the replication of modular units of moderate size, rather than the development of new forms of integration reflecting durable, genuinely centralized control. Similarly, the bulk of settlement, and presumably population as well, continued to hug the old central levees rather than moving out into the newly opened areas. Probably this not only implies attachment to the older towns but indicates that many of the areas served by the newly expanded irrigation system were characterized by inferior, poorly drained soils, not suitable for the intensively cultivated, regularly manured summer cash crops that normally were planted close to the towns. In other words, the expansion in gross output came at the expense of declining productivity of land and labor. Almost certainly it also involved a decline both in long-term capacity to survive serious environmental perturbations and even in short-term economic well-being. A large-scale, increasingly artificial canal system under the aegis of the state also could only be introduced together with a corresponding reduction in lands formerly devoted to grazing. This implies a loss of some of the resilience always represented by large flocks, held in reserve as an alternative subsistence resource. Finally, the emphasis on an enlarged, more integrated canal system increased the scale and complexity of its routine maintenance—let alone the problems of attending to its repair after any severe damage or disruption. Tasks that had been within the capacities of local communities were so no longer, so that even the smaller, more rural components of the system became more and more dependent on the effective functioning of an inherently unstable and politically vulnerable imperial bureaucracy.

These structural weaknesses, though of growing importance and perhaps ultimately decisive in the general collapse that accompanied the later 'Abbasid period, should not be overstated in their initial impact. For at

least a few centuries in late Sasanian times, and possibly again in the Early Islamic period, the magnitude of irrigation activities altogether dwarfed all other forms of land use and may have come close to realizing the full potential of the region. Hence the more immediate consequence was an unprecedented prosperity, reflected in the scale of urban construction as much as in the enlargement of the canal system itself. The capacity to design and build a system linking the Tigris and Euphrates in order to meet agricultural requirements that could not be met by either river alone was, it must be stressed, a historic achievement neither matched nor superseded before modern times.

Returning to the unintended consequences of prolonged settlement and canalization, we must mention desertification. The "natural" pattern of the Euphrates would be to spill over into backswamps and depressions, to alter course, perhaps not to water all areas uniformly (certainly not in any short period of time), but to create a mosaic in which many local areas of periodic flooding and sedimentation lay alongside other small areas that were temporarily unwatered. After abandonments of the kind mentioned above, however, the Euphrates and its adjoining perimeter of cultivation moved far to the west. Only rare, great floods now would carry water inland. A vast, more or less permanently dry region now was exposed to wind erosion. The crests of the spoil banks and levees of former canals, most exposed of all, had been flocculated by salts that had accumulated there through capillary action, becoming "puffed solonchak" soils of very loose, soft structure that were easily carried away by the wind (Buringh 1960, pp. 89, 161). These wind-borne particles in turn began to abrade away others, initiating a process of massive wind erosion and the consequent development of extensive dune fields as one of the dominant landforms of the region. And dune fields, in their turn, tend to make the process irreversible by seriously deterring the reopening of the region to agriculture.

#### FEATURES OF A PREMODERN EUPHRATES LANDSCAPE

As we have seen, the topography of the floodplain as a whole has been shaped by intersecting natural and human forces. Partly complementing and partly offsetting one another, they account for an ordered sequence of westward riverine movement, for intercalated networks of levees and depressions, and for shifting zones of settlement and cultivation. Seen from a distance, or over progressively more inclusive intervals of time, the dominant impression is one of broad, systemic change.

These more detached, inclusive perspectives are precisely the ones imposed by most of our data. The findings of archaeological survey cannot (at least with the techniques employed here) be differentiated into units shorter than several human life spans. Frequently, therefore, the



settlement patterns we detect may be conflations of shorter cycles of occupation and abandonment, as well as being naturally more incomplete than if we could encounter ancient villages and towns as living entities. Even the textual sources, precisely dated though they occasionally may be, generally view the agricultural regime from the more distant perspective of the urban scribe or absentee estate administrator whose problems are those of accounting for flocks, crops, and agricultural laborers in aggregated units. Idealized versions of the calendar round of agricultural activities do exist (Jacobsen 1958, pp. 55–58; Salonen 1968, pp. 202–12; El-Samarraie 1972, pp. 64–71), but they are abstract, static statements that take no account of real patterns of individual perception, choice, and behavior in a forest of uncertainties.

Yet as we descend through levels of inclusiveness toward the individual community at a particular point in time, at least some of the aspects of structural change that predominate in a larger view quickly diminish. Ceaseless change of a different kind in the destinies of individuals and groups naturally continues, but within enduring parameters of behavior and ranges of expected outcome. Behind a screen of intense local variation, continuity from a very remote past probably governs not only the seasonal subsistence cycle but many other social and economic relationships that are closely tied to the circumscribed horizon of a community's own agricultural activities. What would be desirable, therefore, is to supplement the foregoing account of long-term ecological changes at the regional level with an impression of more or less momentarily coexisting interrelationships in a much narrower orbit. Only in very recent years, with the growing penetration of modern health, education, communications, and transport facilities and with the provision of mechanical and chemical aids to agriculture itself, has all this changed irreversibly. Hence the microcosmic view that is needed—or a series of such views, if the data permit—must predate the modern era.

Consistent with the primary focus of this study on settlement and irrigation patterns, two contrasting documents may exemplify these supplemental impressions. At the beginning of this century the German expedition to Fara, ancient Shuruppak, prepared the first, a detailed if somewhat imprecise sketch map of their environs (Andrae 1903). Recast onto the base map prepared from the air photographs of the region, their findings provide at least a glimpse of the traditional rural landscape within the radius of less than a day's foot journey.<sup>9</sup> Still somewhat generalized in that field boundaries, ownership, frequency of cultivation and similar details are not provided, figure 4 nonetheless brings us considerably nearer to the reality of a rural settlement pattern than is possible from the findings of archaeological survey or cuneiform texts alone.

Perhaps the dominant impression to be drawn from this map is that at least this tribally organized group of

agriculturalists had a comparatively slight effect upon the control of water and land, its primary factors of production. The parent watercourses seem to have been allowed to maintain essentially natural, uncontrolled regimes, with irrigation depending upon flooding behind small earthen dams and distributary canals so small and infrequent that they were not even illustrated. Insequent channels varied greatly in width and depth as they wound from depression to depression, sometimes being lost to sight altogether as they passed through swamps. Regular layouts of fields were distinguished by their absence. The selection of lands for cultivation depended upon casually opportunistic considerations of ready availability of water, so that labor inputs were kept absolutely minimal. Clearly, this was an extensive rather than intensive system of land use, at first glance seeming to imply that neither water nor land was regarded as being in any way limited in supply relative to needed crop production or available agricultural labor (Andrae 1903, pp. 24–26, trans. in Adams and Nissen 1972, pp. 81–82).

Yet we know that the map was made at a time when there had been a catastrophic loss of water in this immediate region through the shift of the Euphrates from the Hilla to the Hindiya channel, so that widespread abandonments had already occurred during the immediately preceding years. Hence a somewhat different interpretation must be substituted, to avoid the distortions of an assumed equilibrium of factors governing agricultural practices. Deep and prevailing uncertainties—as to water supply, security, and the tax and conscription demands of a predatory central government—militated against anything more than minimal investments in either agricultural facilities or settlements. Flexibility of response instead was the key to any successful adaptive strategy, tied to the maintenance of large herds as an alternative subsistence resource and to provision for rapid movement of tribes or other local groups with all their belongings (Adams 1975*d*, 1978). Seen in this light, the relative superficiality of the modes of land use that this map documents is not an atavistic feature, but rather one dictated by conditions that must have recurred frequently throughout the historical sequence.

We cannot assume, however, that the picture afforded us in a particular instance may be extended to the countryside as a whole in all periods. Andrae contrasts the massive canal banks near Babylon with their virtual absence here, and there is every reason to believe that agriculture in the hinterlands of ancient cities was generally much more capital- and labor-intensive—as indeed it still is today. Part of the difference, to be sure, lies only in the fact that in such settings cultivation may have continued uninterrupted for centuries; spoil banks built up over long periods convey a misleading impression of the labor needed at any one time for canal construction and maintenance. But urban continuity, as well as the nearness of

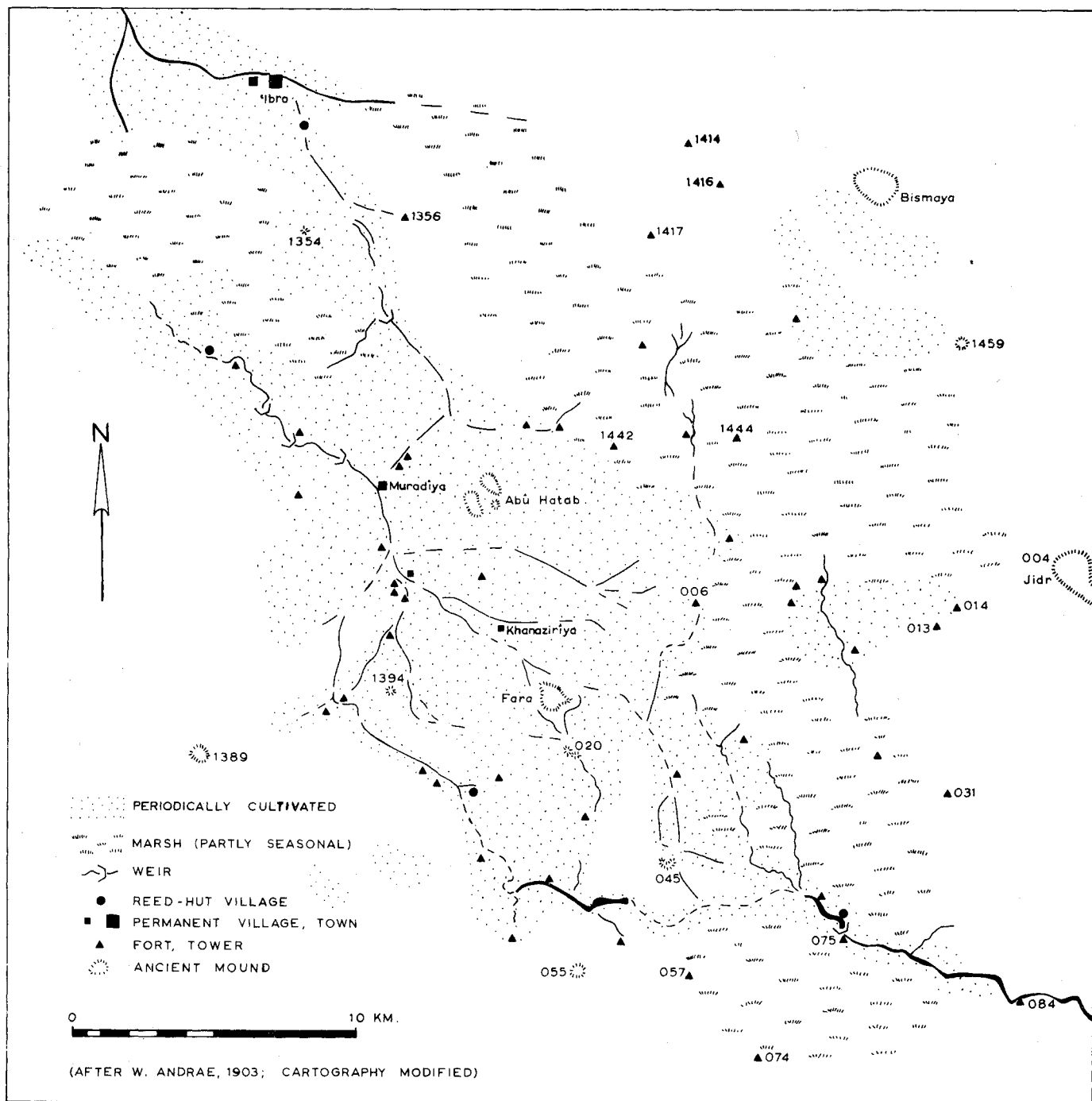


Fig. 4. Settlement and cultivation in the Fara region, ca. 1900.

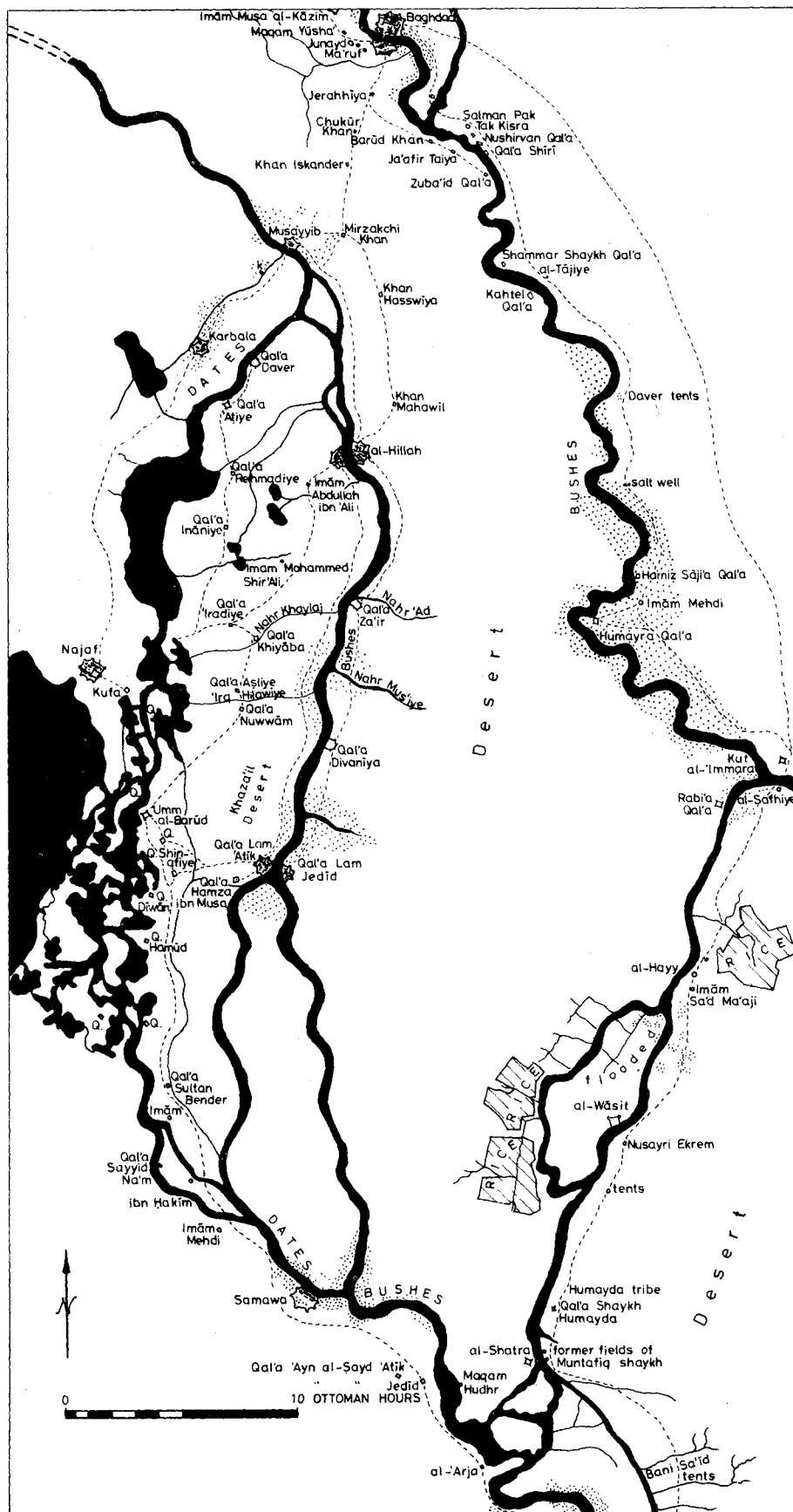


Fig. 5. An Ottoman view of the plain below Bahgdad, A.D. 1848.

an assured urban market, surely provided incentives to gradually undertake many improvements like ditching, manuring, land-leveling and field-bordering that would enhance productivity. Valuable as is the picture reconstructed for the turn of the century around Fara, therefore, the extent of its applicability needs careful qualification. In brief, it is probably most representative of situations remote from cities, and of periods of political flux rather than stability.

The prevailing absence of security at the time of Andrae's work is emphasized by the ubiquity of small mud-walled fortifications. Most are found along the more substantial watercourses, not infrequently accompanying small weirs and canal offtakes that they were intended to protect (cf. Adams and Nissen 1972, pp. 75-76). At least some, however, apparently were near the enclosing frontier of the steppe and may have been intended to supply immediate protection for herdsmen and their flocks against sudden, short-lived seminomadic incursions. It was observed during the survey that the ruins of these small defensive works were almost invariably accompanied by habitation mounds implying small adjoining settlements. Andrae fails to record most of these, perhaps because they had already been dismantled when water shortages first became serious, whereas the little forts and towers remained for him to see, since they could not be carried away.<sup>10</sup> No doubt these fortifications were intended primarily to meet conditions of endemic petty raiding, with refuge from more serious attacks being sought in flight. Again this suggests that we are dealing here with an acephalous rural pattern, perhaps occasionally capable of providing a loose defense in depth against urban encroachments, but in the main flourishing only in their absence or remoteness.

Around the major ancient towns, we may speculate, the only fortifications allowed would have been intended primarily for the protection of officials and travelers. As such, they would have been centrally maintained and more impressive as well as much less numerous. But it is to be regretted that premodern maps of urban hinterlands with a comparable recording of detail are not avail-

able. To the urban-based official or traveler it was the permanent towns, caravanserais, and interconnecting routes that were important, not the volatile disposition of a restless tribalized peasantry over the countryside. Hence the contrasts between more stable, densely settled urban peripheries and genuinely rural areas—or perhaps between well-ordered kingdoms and interludes of prevailing civil strife—that were suggested above cannot be established. Incompletely representative though it may be, the map of the Fara environs remains our most substantial clue to the convergence of natural and human agencies within a local setting of the kind that constituted the traditional Mesopotamian landscape.

Looking beyond that closely circumscribed setting, however, it may be useful to compare the reality of the premodern countryside with an urban perception of it embodying all the systematic biases just mentioned. Figure 5, redrawn from an Ottoman War College map roughly half a century earlier than Andrae's work, reflects a concern only with the garrisoned strings of towns along the principal watercourses.<sup>11</sup> Even the rivers themselves are only impressionistically mapped, and the canals and subsidiary streams upon which the life of the population depended were clearly of no interest to the cartographer. The entire populous district of which Andrae's map shows only a small part falls in the vast tract between the two rivers and hence was also outside his purview.

The Ottoman cartographer's conception of the land, I suggest, was typical of that of most of its historical administrators and literati. The reality always has been that city and countryside form a fluid continuum, an interaction or systemic interdependence that this study seeks to trace out in greater detail. But cognition mediates reality, sometimes simply excising patterns of life when they cannot be fully controlled or even comprehended. This testifies to an enduring feature of Mesopotamian urban consciousness, a pattern of selective perception that tinctures most of its prodigious outpouring of written records. The only available corrective, it can plausibly be argued, is one that the archaeologist seeks to supply through reconnaissance and excavations in the countryside.

## 2

# The Recovery of Ancient Settlement and Irrigation Patterns

The foregoing chapter provides a very generalized historical overview of the morphogenesis of a landscape, in which the Euphrates River played a basic and initiating, if not always immediately decisive, part. The cumulative record is one of broadly increasing but uneven human interactions with natural forces and constraints, ultimately leading to a profound modification of the lower alluvial plain away from its "pristine" condition. Interrelationships among human groups were of course also increasing in scale and complexity and shifting in character, but a developmental account of human institutions is within our purview here only insofar as it was importantly mediated by factors of land and water.

An archaeological survey supplies the connective fabric and body of comparable data from succeeding periods on which this account ultimately depends. Surface reconnaissance alone, without the enrichment of historical and ethnographic insights or the modifications and improvements in precision that would be made possible only by a closely associated program of excavations, furnishes at best an exceedingly limited framework of interpretation. But its complementary virtue is that it helps to overcome some of the biases and accidents of discovery that suffuse most bodies of ancient textual and archaeological data pertaining to specific periods. It permits us to perceive gross differences and similarities that span millennia, and to seek explanations for problems of long-term ecological interaction that our ancient informants either never considered or dismissed as commonplace and hence not worth recording.

This is not the place for a critique and rationale of archaeological settlement survey as it has been elaborated in a variety of other regional settings (cf. Parsons 1972; Johnson 1977). Ancient settlements, like most other relics of past human behavior, reflect social decisions made under a variety of inducements and constraints. Some aspects

of their distribution and internal structure may be of a largely cultural character: they may reflect an ethnic or linguistic boundary, persist in a particular place because of its religious associations, or maintain this or that form of urban hierarchy in response to this or that set of administrative, commercial, or other considerations. Many features of settlement are responsive at least in part to conditions of scarcity: of water, of building materials, of transport routes and facilities. Still others, probably the great majority, articulate these responses to scarcity with historically derived perceptions and potentials: the extent of functional differentiation and integration that a particular society encourages and will sustain, its level of technological proficiency, its readiness to cluster or agglomerate, and its subsistence choices or imperatives. There is nothing inclusive about this listing. The point is only that all human settlement is patterned in many complex ways, the unraveling of which can provide insights into social change and stability by no means limited to man's spatial disposal over the landscape. The refinement and proliferation of settlement pattern studies therefore reflects the widespread recognition that it is a legitimate goal of archaeologists and anthropologists—and, a fortiori, of geographers—to make those patterns intelligible.

A number of the presuppositions and avenues of approach that are essential for archaeological survey in southern Mesopotamia have been set down in a previous study of a generally similar kind (Adams 1965, Appendix A), and they will not be repeated in detail here. The most basic principle is that settlement accompanies agriculture, and that both are dependent upon assured supplies of irrigation water. The vestiges of ancient settlement survive for the archaeologist to discover in the form of mounds or tells, built up layer by layer out of decomposed mud brick and other architectural and living debris. Where tells fall into a linear pattern, as they generally do, a kind of least

effort principle allows us to hypothesize that the line is approximately that taken by the watercourse serving those settlements during their floruit. With the addition of air photographs, the individual watercourses, and even superimposed sequences of watercourses dating back to fairly remote periods, can often be seen. Then, adding a final methodological element, the superimposed occupations of the tells can also be detected from the ceramics and other debris profusely littering their surfaces. Mounds and watercourses thus can be brought together into an integrated, changing system or sequence of systems, the major epochs tied to ceramic and other chronologies that necessarily depend in large part on excavations.

Such is the rationale of the general approach. Even more important, however, is the mode of its detailed application in concrete, varied circumstances. It is to the special requirements, procedures, opportunities, and limitations of the survey itself that we must now turn.

#### MAPS, AIR PHOTOGRAPHS, AND THEIR INTERPRETATION

The region covered by this account heretofore has received little cartographic attention. Potentially of greatest utility is an Arabic 1:50,000 map series, but the existing sheets are restricted in availability and vary uncontrollably in quality. They naturally concentrate upon regions of current economic importance within the frontier of cultivation, moreover, and virtually ignore the desert topography beyond it. More immediately useful, therefore, is the British one-quarter-inch (1:253,440) map series, perhaps most widely available in a slightly modified reproduction by the United States Army Map Service. This furnishes a detailed (though now badly outdated) guide to cultivated areas, particularly valuable for the names that are carefully transliterated and copiously supplied. But again the extent and reliability of coverage decline abruptly beyond the frontier of cultivation. Only a handful of the most prominent landmarks (principally ancient mounds) are located with any precision. Elsewhere the desert topography either seems to have been sketched in from informants' imprecise and not wholly factual descriptions—to be rendered in such conventionalized form that its relationship to existing features is often very difficult to discern or to be dismissed with the legend "unsurveyed desert," which is at least more honest. As for the aerial navigation charts available from various United States military services at scales ranging from 1:250,000 to 1:1,000,000, they are so generalized as to be useless for ground reconnaissance in uncultivated areas.

Archaeological survey, under these conditions, includes a heavily time-consuming but altogether indispensable component of primary mapping. The means at hand, crucial in its own right as a source of voluminously detailed

information on subtle differentiations in soil texture, moisture, and surface vegetation that are the relics of ancient watercourses across an alluvial plain, was a set of KLM aerial photographs at an approximate scale of 1:35,000, made temporarily available for my use by the Directorate General of Antiquities after being supplied by the Directorate General of Surveys. No mosaic composed of these photographs was available, however, nor could adequate ground controls be introduced by my own limited mapping efforts to compensate for the inevitable, generally small distortions arising from variations in camera elevation and perpendicularity.

My procedure in mapping was to tape together a mosaic consisting of a dozen or more individual KLM photographs, anticipating that the matching of different parallel runs would help average out distortions in individual photographs and runs. After a quick tracing of a few salient features, the mosaic then was disassembled and the individual photographs studied in greater detail. Prolonged examination was always necessary, under many different conditions of lighting. Gradually a pattern of linear discolorations emerged, generally consisting of the faint traces of ancient levees, to supplement more contemporary and obvious features like outlines of seasonally swampy depressions and fields of dunes. Highlighted with a marking pen, these faint lines could then be added to the mosaic tracing. At some point a provisional map of sufficient area was ready to serve as a basis for fieldwork.

The field survey was largely concerned with ancient settlements rather than with the intricate overlay of tracings of canals and rivers of various periods that constituted the dominant evidence on the air photographs. Most, though by no means all, archaeological sites were associated with at least a slight rise in elevation over the surrounding plain surface, and any perceptible eminence routinely became the object of a visit. Perhaps half of the sites that were located had been previously identified tentatively on the air photographs as suggestive discolorations, either lighter or darker than surrounding areas depending on complex conditions of salinity, moisture, and time of day when the photograph was taken. Differences in surface texture also proved suggestive, low mounds often showing up as more uniform or "smoother" areas, perhaps because of some reflective property of the sherds littering their surfaces. But, while most sites could be fairly unambiguously identified once their location had been pinpointed accurately, it must be stressed that the photographs were in no sense an infallible guide to the archaeological sites. Hundreds of suspicious discolorations were visited in vain, often with considerable difficulty in reaching and exactly locating them on the ground, while in a few other cases fairly large and prominent sites were found to which the photographs provided no clue even when closely examined with a strong hand lens.

## The Recovery of Ancient Settlement and Irrigation Patterns

Thus the matching of the archaeological sites to the provisional mapping of ancient river and canal traces was a pervasive, demanding problem. In a sense, two maps had to be elaborated simultaneously on a single base, of which only one, the watercourses, was essentially dependent on the aerial photographs from the outset. The archaeological mapping had to have as its starting point one or more major mounds, canal junctions, or other features that could be unambiguously located on a photograph. From there it was carried forward by triangulation with a prismatic compass (multiple readings permitting something on the order of  $\pm \frac{1}{2}^\circ$  accuracy) and measured odometer distances, transferred to the provisional base map with a three-arm vernier protractor.

Periodic opportunities to bring these two semi-independent mapping systems into correspondence were obviously vital. Sometimes they were provided by additional canal junctions or similar features visible on the photographs, from which further sightings could be taken on mounds already provisionally located. Even more useful in this respect were the ruins of small mud-walled watch-towers and enclosures, the remains of nineteenth century and earlier settlement in areas now wholly abandoned, that occur on the summits of many mounds in the region. Study of the approximate area on a photograph would continue until, with the aid of a pocket microscope if necessary, a structure as small as 4–5 meters in diameter had been clearly identified at the 1:35,000 scale. With a new position thus fixed, the locations of sites found on earlier traverses could then be reconfirmed and if necessary corrected.

The need for major, continuing corrections in a process of this kind must be recognized as an essential condition for accuracy. Simple errors in measurement account for part of the difficulty, but far more common and serious were misidentifications of the mounds and other features—low, lacking distinctive form, frequently mirage-ridden and obscured by dunes and blowing sand—upon which triangulation sights were taken. To reduce these errors, I frequently built temporary cairns out of bricks and other surface debris on accurately located mounds that might later be useful for bearings. But the guiding principle in both detecting and overcoming them was to rely on redundancy of measurement, recording as many bearings as possible on mounds in all directions rather than merely two as a requisite minimum.

The linear traces of ancient watercourses also were added to as the mapping of archaeological sites proceeded. More detailed examination of the air photographs, in connection with locating particular sites, added some. Others were first observed on the ground and only later found on the photographs as well. Still others emerged from more problem-oriented study, as unfolding awareness of the pattern formed by sites occupied

during a particular period led to hypotheses about where the associated canal routes should be sought.

A penultimate stage in the mapping involved calibrating latitude and longitude intervals from known landmarks in the air photographs, principally along the Tigris and Shatt al-Hilla courses. At this juncture certain distortions became evident, arising from the use of individual aerial photographs as a surrogate for a map base. Map sections that had been drawn from temporary mosaics of photographs, progressively extended northward from the Euphrates near Warka, had to be joined with those developed from air photographs of the Tigris course west of Kut. Cumulative discrepancies over this distance of about 140 kilometers, before partial correction by averaging errors and redrafting, varied from 400 meters to about 1.4 kilometers; it is reasonable to suppose that most or all have now been reduced to less than 1 kilometer.

Finally, the draft of the base map prepared in the field was photographically reduced and completely redrafted. At this time an effort was made to apply consistent standards and symbols of representation, and the original site-numbering system that followed the order visited was replaced by a system based on contiguity that permitted easier reference. It is regrettable that the air photographs were not available to me for continued use as the analysis of the survey's findings proceeded after completion of the base map. The discovery of long lines and consistent patterns of contemporary settlements, displayed herein in a sequence of maps of sites occupied in successive historic periods, argues forcefully that certain apparent lacunae might be filled by more closely examining the photographs for those areas. But any iterative process of closer approximation and improvement of detail ultimately reaches a point of diminishing returns. It seems rather doubtful that the additions that might be made by further restudy of the air photographs—using only these methods, at least—would be significant ones.

There are several features of the base map, conventions systematically followed in its preparation, that one should bear in mind. Differing fundamentally from air photographs, any map is a system of symbols, a selection of certain aspects of reality for representation at the expense of other aspects. This map, in the first place, seeks to minimize inclusions that are of modern origin. No indication is given of roads and communications, even the most important trunk routes. A number of the more important contemporary towns of the region are conventionally shown for convenience of reference, but no attempt is made to give the names and locations of the large number of smaller settlements. The major rivers are in their modern position, or at any rate in the beds they occupied at the time the air photographs were taken in 1961–62. Modern canals are not shown, however, to the extent that they can be differentiated from earlier

ones through the evidence on the aerial photographs alone.

This last-mentioned convention obviously introduces a degree of ambiguity, since I will argue later that earlier canal levees generally have been selected as the optimal courses to be followed in the design of subsequent irrigation networks. But, fortunately for our purposes, comprehensive modern systems have only begun to be introduced in the last few decades. And the traditional system, for a long time haphazardly maintained and more recently subject to small-scale, eclectic extensions, fails to obscure at least its larger-scale antecedents of the Sasanian and Early Islamic periods. The latter differ not only in size but in straightness and in regularly branching elements of an overall design. These features in most cases can be identified beneath the irregular and discontinuous segments of later centuries and are the only ones to appear on the map within the zone of cultivation. Beyond the limits of cultivation, on the other hand, essentially all traces of former canals and meandering, presumably more "natural" watercourses that are visible on the air photographs have been recorded on the map as of relatively ancient origin.

Clearly, the air photographs permit a recording of former watercourses in the desert areas much superior to that in the cultivated zone. But there are limitations and uncertainties to be kept in mind even there. Only a few of the very largest ancient canals can be readily followed on the photographs as continuous lines. More commonly, parts are quite apparent, but most can be followed only with considerable difficulty, and in a few places the lines cannot be detected at all. To increase intelligibility, all of these conditions have been rendered on the map by continuous lines of uniform width, insofar as the existing gaps are small enough to leave a reasonable assurance of the continuity of the original canal course.

The use of lines of uniform width (except in the case of a few major arteries like the Shatt al-Nil) obviously sacrifices information on ancient canal size that would be useful for some purposes. One can imagine studies concerned with population density, for example, in which estimates derived from aggregate areas of settlement are checked and complemented with estimates of aggregate agricultural output derived from calculations of canal capacity. But the variation in the clarity of the photographic traces indicates the difficulties that will beset such an effort, at least until it is undertaken on such a scale that the photographic evidence is massively supplemented by ground recording. Levee width alone, moreover, is at best a somewhat dubious measure of canal size. Long-continued use of a small canal may lead to the accumulation of spoil banks as massive as those from a briefly used larger one, and changes in slope and cross-sectional area can also have important effects on the siltation rate.

An approach to ancient demographic, social, and economic conditions through a network analysis of flows in the canal system at a given period, therefore, is very likely to require an extensive program of levee cross-sectioning.

Still a further difficulty is that elevated levees are exposed to wind erosion, particularly as the balance of surface material in an area shifts toward fine, unconsolidated sand. Sharply contoured, substantially elevated spoil banks of former canals are absent in this entire region except where they are associated with settlements that demonstrably were abandoned within the last century or so. Hence the mass of remaining levee material may be in no way proportional to the original mass. However, this does not mean that levees can simply be blown away without leaving any trace. Probably there is a sorting process in which heavier particles are left behind, for even very low levees that are almost imperceptible on the ground frequently are associated with a clear line of discoloration on the air photographs. Another possibility, suggested by a Cassite canal adjoining site 1590, is that compacted material in the bed of a canal may tend to be cemented together by clay and fine silt particles. In that instance, at any rate, a slightly elevated white ribbon of canal bed deposit remained behind although the spoil banks that once must have adjoined it had completely disappeared.

The largest dune field in the region, extending from ancient Adab to beyond Umma in a southeasterly direction, directly adjoins and largely overlies the traces of the largest and most long-lived of the region's ancient watercourses. It cannot be doubted that the bulk of this aeolian material is locally derived, and that in fact these dunes embody in an altered state a considerable part of the original mass of the river levee. Figure 32, traced directly from the air photographs, illustrates the patterning of the dunes in relation to the surviving traces of the watercourses, which in many places have been etched into low relief by the same wind-borne sand that elsewhere covers them.

How should we interpret these traces? Generally they consist of close-spaced, varvelike patterns parallel to the direction of flow in the bed. Probably they are to be explained as relics of alternating intervals of high and low flow, for such alternations would necessarily be accompanied by differences in bed-load particle size. But a more difficult question concerns the dating of the existing surface traces. If a very large proportion of the parent material of the levee has been scoured away, then the varves should represent a conflation of the beds occupied by the watercourse during a large part of its existence. In the absence of evidence of successive meander-cutting, however, this is not the appearance given by the existing traces. Instead, therefore, we are probably witnessing the bed only as it was situated during the terminal period



of full-scale flow, covering all or part of the Isin-Larsa period. That the bed as shown is not later than the early Old Babylonian period is shown by sites 1175 and 1460, both of which date from that period and are positioned directly over the watercourse after it must have ceased to function.

A somewhat different interpretation appears to be required in the case of the watercourses joining in the vicinity of site 039 and continuing south-southeast to supply Uruk. The visible traces of a bed here closely adjoin a series of sites (039, 097, 100, 131, 242, etc.) that continued into the Old Babylonian period but that were not occupied later. On the other hand, site 1555, which was apparently already abandoned by the end of the Isin-Larsa period, is not associated with the visible traces of this or any other watercourse. Here, therefore, the bed that can be followed on the ground and in the air photographs is apparently Old Babylonian, that is, slightly later than the larger bed that can be traced southeast of ancient Adab. But the two cases are similar in that only the terminal period of use of the watercourse appears to be represented in its surface traces.

A third instance of a major natural watercourse, requiring an interpretation substantially different from either of the foregoing, is the complex series of meanders northeast of Nippur. The upstream traces of this watercourse have been first identified northeast of ancient Kutha, adjoining the important late prehistoric town of Tell 'Uqair (Buringh 1960, fig. 72). Shortly disappearing, they reappear again near site 670 more than 70 kilometers downstream, emerging at that point from beneath the heavy overburden of a series of major, much later canal levees that all tend east-northeast. The course is lost to view again under the recent sediments and disturbances of cultivation associated with the Shatt al-Gharraf, more than 75 kilometers southeast. Over much of this distance it can be traced not as a single, slightly sinuous but on the whole relatively linear bed, as in the two foregoing cases, but rather as a series of alternate courses of considerable breadth, variability, and obvious duration. There is evidence, for example, for the formation and pinching off of several meander loops, while elsewhere (near site 1171) a process of lateral meander movement or "sweep" can be followed over a distance of more than 6 kilometers. This is a strikingly less controlled, more "natural" river regime than in the other two cases, and it clearly reflects the successive beds associated with that regime over a much longer period.

The lower end of the observable part of this ancient watercourse, northeast and east of ancient Adab, appears to differ in important respects from the remainder of it. Traces of alternate course-cutting and meander migration disappear. There are also several bifurcations in the channel that appear curiously stable and unaffected by the processes of movement that are so evident farther

upstream. Interpretation is unfortunately made more difficult by the fact that, immediately below these bifurcations, the massive overburden of recent Shatt al-Gharraf sediments obscures whatever further traces there might be. But what can be seen is perhaps best explained by the hypothesis that stream velocity was greatly reduced at this point, and that we are witnessing the remains of a deltalike series of mouths through which the channel found its way into a much larger body of water. An attractive candidate for the latter is a long arm of the Arabo-Persian Gulf, extending more than 300 kilometers northwest of its present shoreline. But of course it is equally possible that the channel at this point merely drained into a large inland swamp or series of lagoons.

The dating of this course, as I indicated in the preceding chapter, can be confidently assigned in the main to the Uruk period. It is most extensively traced out by accompanying settlements in the Early and Middle subphases of that period, seems to have undergone partial abandonment in Late Uruk, and survived into Jemdet Nasr times only as a few vestiges. Most or all of that span is presumably reflected in the sequential development and then permanent demise of the meandering watercourse that can still be traced out on the surface. In this case, it thus appears, either accompanying alluviation was less extensive to begin with or wind erosion of the former levee has been extensive enough to expose underlying beds that still remain buried in the former two cases. Such wind erosion, if it did occur, probably was at least partly antecedent to the many later canal systems whose levees now overlie the bed, their cross-cutting patterns suggesting many alternative directions of flow. This implies that a major cycle of wind erosion may have occurred before the Third Dynasty of Ur. Such a reconstruction can only be somewhat speculative at present, but it argues plausibly for the first appearance of dune fields in the region, embodying these wind-eroded levee sediments, by no later than the mid-third millennium. Whether the substance of dunes of that antiquity has remained permanently unconsolidated since then, while shifting from place as atmospheric circulation or topographic conditions changed, can only be a matter of conjecture. We have noted, however, that wind deposition of sheetlike deposits tending to merge imperceptibly with the plain surface is going on simultaneously today. That suggests a shifting balance of wind erosion and deposition, a process of recycling from cultivable plain to dunes and back again, which may continue indefinitely.

While these three cases are of considerable importance to the reconstruction of settlement and irrigation patterns in the periods to which they pertain, my purpose in discussing them here has not been to deal with their historical impact. They are intended to illustrate the range of topographic information on early watercourses that the air

photographs and surface reconnaissance make available, opening up rich interpretive possibilities for unexpectedly early periods. It must also be clearly recognized, however, that these possibilities are beset with limitations and ambiguities that are unlikely to be overcome without much more detailed study.

As the base map profusely illustrates, ancient canal levees of various periods repeatedly bifurcate, intersect, and cross one another. In many cases the air photographs suggest which canal line is superimposed on, and hence is presumably later than, the other. But that evidence often involves a large element of uncertainty. Since canal levees were so often reused, moreover, what might be interpreted as the stratigraphically superimposed, later canal may be no more than a late reuse of a line that on the whole precedes the one it apparently crosses.

There is a still more intractable difficulty in trying to illustrate the set of junction points that defines the branches of an ancient canal system as it functioned at any given time. Such systems were continually subjected to major as well as minor alterations in an adaptive process that took account of reductions and uncertainties in flow as well as many other variables. From a very early time, certainly no later than the early third millennium B.C., it was a design characteristic throughout this region that districts could be supplied with irrigation water from at least two different trunk canal systems that presumably would be unlikely to suffer simultaneously from impediments in flow. Hence the actual pattern of flow must have been at least in part a matter of local option. To speak of the nodes and branches that constituted a canal system "at any given time," therefore, only begs an unanswerable question. Was the "time" at which we attempt to offer a map representation of a system the moment it left a Sasanian engineer's drawing board? A normal year of operation or a year of water shortfall? A summer or a winter growing season? Or even, a particular *day* in the operation of the system? The answer would quite possibly be very different in all these instances. Except in a few cases that are completely unambiguous (again, the Shatt al-Nil provides most of these exceptions), all crossed canal lines accordingly have been broken at their junctions to indicate uncertainty as to the sequence or contemporaneity of the canals involved.

One other modern human artifact appears on the base map—the frontier of cultivation. The one that is continuously delineated is taken from the air photographs and hence corresponds to the early 1960s. More recent extensions in the cultivation zone have in some cases been substantial. This is particularly so to the north and east of the surveyed region, where the relatively more adequate waters of the Tigris and the Shatt al-Gharraf have encouraged not only government-initiated schemes but also a rapid lengthening of the tails of existing canals

by local cultivators. Arrows are employed on the map to suggest the direction and extent of these recent movements. No attempt was made during the fieldwork to keep a continuous record of the new position of the frontier, however, so that the map furnishes only a very approximate indication of what has been a significant shift in the proportions of cultivated and uncultivated land over a relatively limited period.

Shown in stippling on the base map are areas of dunes. In large part these lie outside the cultivation perimeter, although in places farmers have sought to stabilize some of the looser, less actively moving dune groups and to extend field canals and cultivation into their midst. There has been no systematic study of dune formations in this area, but the dune fields whose outlines have been traced from the air photographs generally consist of symmetrical, lunate forms of *barchans*, sometimes closely grouped into oscillating, wavelike ridges with alternating barchanoid and linguoid elements (Cooke and Warren 1973, p. 288). In this region individual dunes are generally small, though some can cover a hectare or more and rise to a height of 7 or 8 meters. It is not the individual, isolated dune that furnishes the principal obstacle to archaeological survey, but rather the much larger, dense grouping that may extend almost impenetrably over several square kilometers. Such groupings may completely cover archaeological sites, and in any case they make it much more difficult to detect sites. Even with four-wheel-drive vehicles, travel is impossible except on rare occasions after a heavy rain, so that a significant reduction in the effectiveness of survey must be assumed within the dune areas that are shown.

As I have described more fully in a separate section dealing with the configurations of a changing landscape, the dune represents only a portion—and probably a relatively small portion—of the aeolian bedforms of the region. Low hummocks or *nebkhas* that have formed around desert shrubs also occur over vast areas, continuing a very rough microtopography within a contour interval of 50 centimeters or less even after the surface vegetation has disappeared and the roots have been reduced to a brittle skeleton lacing the sand together. Least obvious to the casual observer are very low, sheetlike deposits, sometimes slightly undulating. They tend to merge with dune fields or to blend imperceptibly into irregularly wind-eroded plain surfaces, so that their thickness and area are usually very difficult to estimate. Occasional gullying after intense local rain squalls sometimes exposes aeolian deposits 10 or more centimeters thick that rest unconformably on the underlying alluvium, even where no hint of such deposits was apparent from the surface. For the moment this serves only to illustrate that aeolian deposits should not be thought of as always coterminous with the dune fields shown as stippled areas on the base map. Subsequently, we will need to consider

further the implications of these deposits for the completeness of the record of the survey.

A final mapping exercise was undertaken on a somewhat experimental basis. Figure 6, covering essentially the whole of ancient Sumer and Akkad, tests the utility for archaeological purposes of the Earth Resources Technology Satellite (now LANDSAT) images. These images are now readily and inexpensively available, including multiband and other image options that offer important advantages for specialized interpretive purposes. The two used for this map were merely standard prints, enlarged to the same 1:250,000 scale as United States air navigation maps. Traces of ancient watercourses shown in the figure are essentially those that can be detected in the LANDSAT images, while the modern river courses and certain other details have been taken from other maps. But the essential point is that the interpretation of the images was done independently from the main mapping based on ordinary aerial photography, so that the two provide largely independent analytical statements about the layout of main features of ancient canal systems.

Certain limitations of the satellite images emerge at once. Their resolving power is extremely low, which of course is why (unlike military satellite photographs) there are no security restrictions on their distribution. It might even be said that they are not strictly suited to the delineation of ancient canal lines and other fairly small-scale, precise features, since the minimum unit of ground definition is about 80 meters in diameter. There is a continuous gradation between linear discolorations that are reasonably unambiguous and a much larger number of others that oscillate between appearing genuine and appearing to be possible figments of the imagination. A somewhat similar difficulty on occasion characterizes the use of ordinary aerial photographs, to be sure, but only in a minority of cases, with little overall effect on the preponderant mass of substantive detail recorded on the base map. Here, on the other hand, the great majority of cases must be classified as more or less doubtful.

Poor resolution perhaps also accounts for the absence of ancillary indicators (e.g., disused segments alternating with contemporary reuse) as to the antiquity of a linear trace that presumably represents a watercourse levee. Only by comparing the LANDSAT-based map with one drawn from the other photographs can the modern features be identified and eliminated. However, some other omissions are more difficult to explain. Coverage in desert areas is particularly poor. Major ancient levee systems that dominate the air photographs of uncultivated areas (e.g., the Shatt al-Nil leading to Uruk, the second Shatt al-Nil northeast of Nippur, and the third, classical Islamic Shatt al-Nil flowing from south of Kish to Na'amaniya on the Tigris) are essentially untraceable on the LANDSAT photographs.

One might wonder, with so many substantial draw-

backs, whether on balance the LANDSAT images can possibly have any utility for the reconstruction of ancient canal systems. I think figure 6 argues conclusively that they do. To begin with, inadequate representation of desert regions is not a problem; those are the regions for which the ordinary air photographs have already supplied an almost indigestibly voluminous record. What the LANDSAT images supply is a very broad overview of almost the whole of the alluvial plain, permitting the major features of canal and watercourse systems in at least the vast cultivated region to be identified very quickly. And the essential congruence of that overview with the findings of many months of field survey and work on other maps and air photographs can be confirmed easily by comparing figure 6 with other maps included in this study.

The LANDSAT system apparently records some very broad aggradational features (i.e., levees) at least as well as ordinary air photographs. Perhaps in the latter these broad but diffuse traces tend to be submerged by masses of subsidiary detail. At any rate, they appear as light lines against a darker field on the LANDSAT images. Possibly levee sediments are in fact lighter in color; they may also appear lighter only because they are slightly elevated and therefore drier. But, whatever the explanation, the reconstruction of these levees in cultivated areas allows the main outlines of the ancient canal systems to be extended far beyond the limits of the surveyed area. Surface reconnaissance confirms that at least some of the levees so reconstructed stem from as early as the second millennium B.C. The bulk are Parthian, Sasanian, or even later, and their interdiction by the Shatt al-Hilla and the reunified course of the Euphrates below Samawa helps to confirm the relative recency of the latter.

Other features emerge from examination of the LANDSAT photographs that are of considerable historical importance, even though they lie outside the region that systematic survey data allow us to deal with in any detail. Alternative courses of the ancient lower Euphrates past Eridu and Ur can be tentatively identified. A complex picture also emerges of river and canal successions and bifurcations in the region around the Islamic city of Wasit, differing considerably from the usual reconstruction in which the medieval Tigris is said simply to have adjoined that town. In general, then, this map serves not only to check and supplement the findings of reconnaissance within the surveyed area and its immediate environs, but also to provide at least provisional coverage of a much larger region including the entire settled core of the ancient alluvium.

#### BOUNDARIES OF SURVEY COVERAGE

While aeolian deposits furnish an undeniable obstacle to desert survey, the obstacles within the cultivated zone

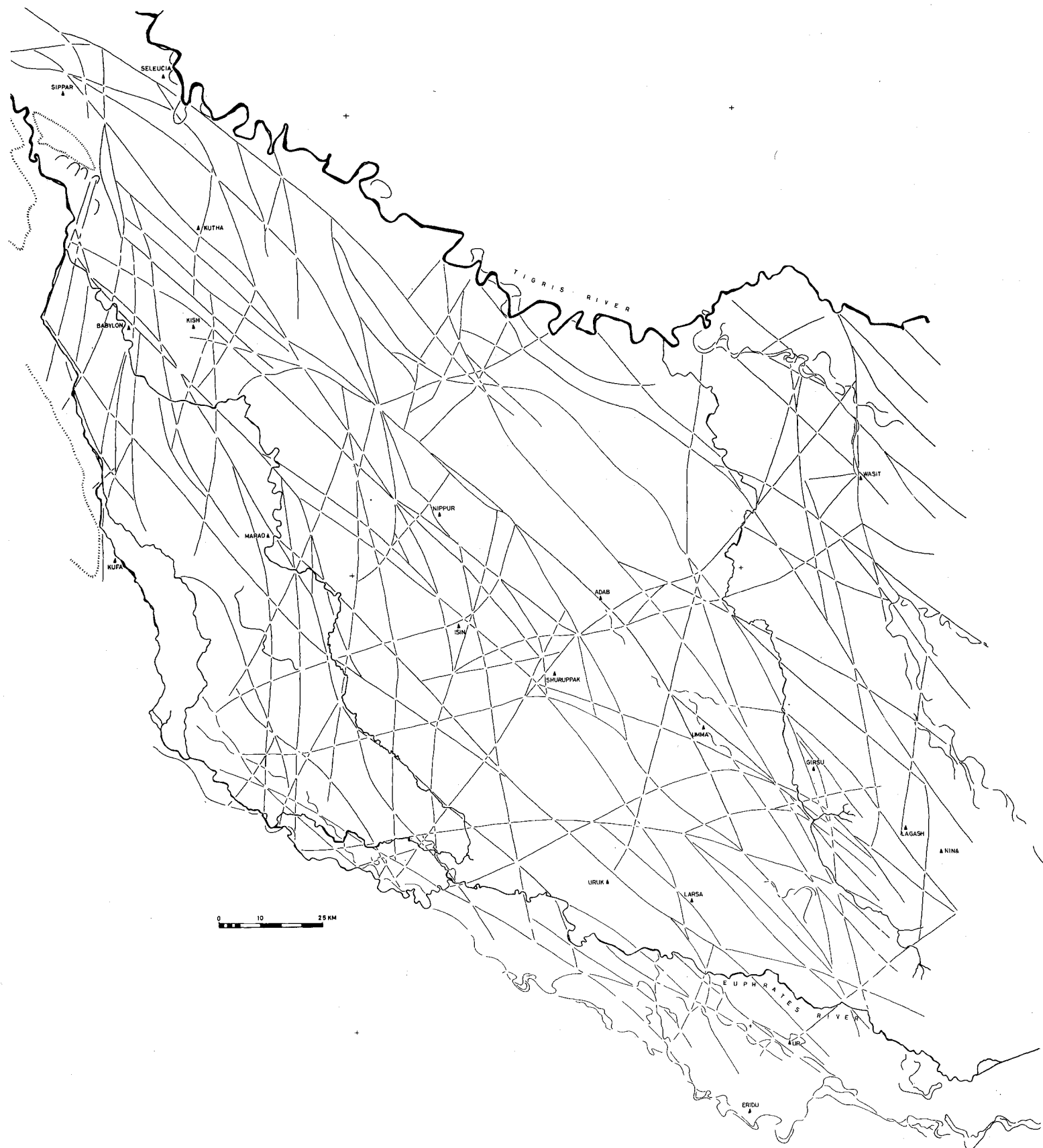


Fig. 6. Major ancient levees identifiable in LANDSAT imagery.

tend to be very much greater. In the first place, ancient canals and watercourses are much more difficult to trace in areas that already lay within the cultivation perimeter at the time of the first comprehensive aerial photography. Further, the small, low sites that are a major element in this survey's analytical framework, particularly for understanding the late pre- and protohistoric periods, are extremely difficult to detect when they occur in cultivated fields. Not only are they easily hidden by the crop plants (and sometimes to an almost equivalent extent by weeds that grow rapidly during the fallow cycle), but they are generally plowed through by farmers rather than left as slightly elevated, uncultivated islands. The result is that the low and subtle but distinctive contour that is created by the cap of sherds on these sites, often visible for a kilometer or more in the open desert, is altogether lost to view. Only by gridding these areas on foot, in traverses not more than one or two hundred meters apart, could the same intensity of survey be achieved as can be carried out in the desert with a primarily motorized mode of travel at grid distances five or even ten times greater. Finally, of course, the presence of canals and cultivation greatly impedes vehicular access to the margins of an area where foot reconnaissance is thought to be necessary.

For these reasons the survey tended to stay outside the frontier of cultivation. As I will presently detail, exceptions were made to take advantage of more favorable conditions or to avoid important lacunae in coverage of major ancient watercourses and urban hinterlands. On the whole, however, it was fortunate that the primary focus on courses of the ancient Euphrates happened to coincide largely with uncultivated areas. As the desert boundary recedes before advancing waves of cultivators, and as the remaining desert land surface is increasingly crisscrossed with roads and other improvements that gravely jeopardize its archaeological sites, those areas were the highest priority of study that could be met within the limited time and means available to a single investigator.

The effective boundaries of the surveyed area are suggested by the distribution of recorded sites, as well as by the cultivation limits plotted on the base map. A dashed line indicating the outer boundary of reconnaissance also is given on the maps showing the distribution of known settlements in particular protohistoric and historic periods. But a fuller discussion of conditions along particular sections of this boundary is needed to relate the survey's findings to the broader pattern of settlement distributions within southern Mesopotamia as a whole.

To the northwest, the area of this reconnaissance adjoins a region that was briefly and superficially examined by the author and Dr. Vaughn E. Crawford as part of the Akkad survey in 1956-57. Much of it lay outside the primary focus of concern at that time, and in fact was

visited primarily to record a site fortuitously exposed by the excavation of the main drainage canal of the Mussayib irrigation scheme (A 221; cf. Harris and Adams 1957). At that time the region was wholly uncultivated, but it has since been included within the expanding Mussayib project. I had expected to use the classical Islamic Nil canal, the ancient bed of which can be easily followed east northeast to the environs of the modern town of Na'amaniya on the Tigris, as the northwest boundary of the present survey. A look at the base map will show that this was done in part, but that in places dense cultivation has now pushed southward across this otherwise convenient boundary.

Continuing south along the western perimeter, the Akkad survey extended to Tell Abu Salabikh (A 275) and Nippur. I visited only a limited number of sites in this area on short field trips during the early 1960s, however, and almost all of them have been rerecorded and assigned new numbers within the present, more comprehensive system. There are a few exceptions shown on the base map for which new data are not available (A 221, 259, 261, 264, 266, 273, 274, and 275). These are given under their original numbers both on the base map and at the end of the site catalog; the data originally published (Adams 1972) on them has been supplemented where possible from the original field notes and from photographs of the collections. Since all of this area farther to the northwest has received some study as part of the Akkad survey, the whole of it has been designated here as one of "limited survey."

South of Abu Salabikh is an area of cultivation provided for by the Shatt al-Dhagharah and its effluents. It forms a long, broad peninsula extending southeast over the towns of 'Afa and Al-Bdayr almost to the site of Fara, ancient Shuruppak. West and northwest of 'Afa this is a zone of dense cultivation, limited drainage, and intermittently marshy conditions. No archaeological sites were reported by residents of the area, nor were any listed in the records of the Directorate General of Antiquities. Consequently no attempt was made to survey it.

East and southeast of 'Afa is a different matter. Water supplies for canal irrigation grow progressively sparser as one moves toward the tails of the Shatt al-Dhagharah system, and reportedly also have grown sparser during recent years as upstream users have claimed a greater share of the available flow of the Euphrates. Soil salinity, which regular, adequate irrigation might otherwise hold in check, has become a serious problem in many areas. This is accordingly a region in which, as the absence of arrows on the base map shows, the frontier of cultivation has remained relatively static since the early sixties. In fact, the frontier can more accurately be said both to have receded in places and generally to have "softened." It no longer marks a relatively abrupt transition between a zone of continuous cultivation and desert. Instead,

there is a wide zone in which large, irregular tracts have gone out of cultivation altogether, while elsewhere some agriculture is continuing. The remains of numerous abandoned villages are to be seen (cf., e.g., Nissen 1968), their inhabitants reportedly having moved to better-favored districts along the Shatt al-Gharraf and elsewhere. It follows that many of the difficulties of conducting an archaeological reconnaissance in cultivated terrain mentioned earlier are greatly ameliorated here.

Two other conditions combined with this to make a relatively systematic survey of the region highly desirable. One was that a number of sites within it were listed in Directorate General of Antiquities records. Information on their dates and location proved of variable quality, but in at least some cases it strongly suggested early occupation. Second, reconnaissance of the Warka area in 1967 (Adams and Nissen 1972) and the initial phase of reconnaissance around Nippur in 1968 had made it clear that several important early canals or rivers flowed through the area. Hence the region was given careful scrutiny during the 1975 campaign. Coverage is undoubtedly somewhat less complete and systematic than in areas where cultivation is altogether lacking, but it is more accurately described by placing the region within the primary zone of intensive survey rather than in one of the peripheral zones of limited survey.

South of this peninsula of cultivation is another area that today is given over to nomads and semisedentary folk. It is a region for which the great mound of Ishan Bahriyat, ancient Isin, may perhaps be thought of as the major focus. To the west lies another frontier of cultivation, this one expanding vigorously eastward. Here the boundary was not "soft" but continuous and relatively impenetrable. It also constitutes the boundary of the surveyed region, therefore, except in a few instances where mounds were found to be accessible from the secondary road network serving the cultivated area. Also shown within the cultivated area are a number of sites that were not visited but that have been assigned numbers because they can be approximately located (and in most cases, dated) from information in the Directorate General of Antiquities files. The site catalog summarizes and gives the source of the available information, and a triangular symbol is used on the map to indicate that the size and location have not been accurately assigned on the basis of direct inspection with the aid of the air photographs, as was the practice for the main body of sites making up the survey.

As I indicated earlier, there are obvious difficulties in detecting small, low sites within the cultivated zone. In addition, however, both the records of the directorate and my own unsystematic observations (while repeatedly driving through the cultivated zone from bases in towns along the lower Euphrates) suggest that substantial elevated mounds are relatively much less numerous than in

the desert. Probably this is because the cultivated zone here adjoins the Shatt al-Hilla and other western, demonstrably fairly recent Euphrates branches. Relatively small, scattered sites of any period might be expected along minor streams or canals, but the substantial, closely grouped, long-continuing mounds of second millennium B.C. and earlier date are to be sought instead along more ancient Euphrates courses that parallel one another through what happens to be desert today.

It is also clear that very active alluvial deposition has been continuing along the modern Euphrates branches for a full millennium or so, with little or no counterbalancing wind erosion in that immediate region. Hence any mounds there that once were of prominent height are likely to have been partially or even wholly buried beneath a thick blanket of sediment. But, if that is so, one must conclude that overbalancing tendencies toward alluvial deposition also were characteristic along the older Euphrates courses to the east when the latter were in primary use. Given those conditions, most of the numerous low Uruk sites that constitute a major theme of investigation in this study may well have been completely buried for a considerable time. The opportunity to study them today thus is an outcome of the westward shift of the Euphrates and the shrinkage of the cultivation frontier since classical Islamic times, both of which have replaced alluviation with wind erosion as the preponderant geomorphic force in the desert.

The entire southeastern part of the region covered by the site map has been previously described as the outcome of the Warka survey (Adams and Nissen 1972). A summary of the same data is included here to provide as comprehensive a picture as possible of ancient settlement patterns on the lower Euphrates floodplain. To avoid confusion of reference, the numbering system applying to the Warka survey has been retained, covering the 466 sites in that part of the region. Starting again with site 501, 1,139 newly numbered sites are cataloged here. Many of these include components of widely different ages, and comprise numerous mounds not immediately adjacent to one another, so that the actual number of sites is somewhat larger.

The eastern boundary of the survey is more simply discussed: with only insignificant exceptions, it follows the frontier of cultivation that is dependent upon feeder canals from the Shatt al-Gharraf. To the south, where the Warka survey was conducted only five years or so after the air photographs were taken, no information is available on recent advances in cultivation. At least in the north, however, the relatively more plentiful waters of the Tigris have led to a wide advance in virtually all areas. Moreover, the newly cultivated lands seemingly are farmed with greater reliance on agricultural machinery, and in wider, more continuous tracts with dense stands of crops not interrupted by old field canal levees and

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other topographic irregularities. Effective survey under such conditions was altogether impossible without a grossly disproportionate expenditure of time.

There is a further area that has been labeled "limited survey" on the period maps. Irregularly triangular and covering about 800 square kilometers, it occupies the northern end of the eastern boundary. This area is largely within the cultivation perimeter, although the intensity of agricultural use appears to have declined considerably in the wake of localized political shifts accompanying the Iraqi revolution of 1958. An archaeological survey of it appeared desirable in order to clarify the source of the water that must have flowed past the important early town of Tell al-Wilaya. Records in the Directorate General of Antiquities indicated that third millennium dates had been assigned to a number of sites in the area (627, 878, 882, 891, and 898) that, if the dates are correct, possibly traced the line of a canal from the Tigris.

As "limited survey" implies, a brief reconnaissance was undertaken in this area along the secondary road network. It was possible to reach a number of the previously reported sites in this manner, including three of the five reportedly early ones that had seemed to define the third millennium canal line. None proved to have early pottery, nor was pottery earlier than the first millennium B.C. seen on any of the other sites visited in the area. Hence the special rationale for conducting an intensive study of the area disappeared, and its exclusion from the normal survey perimeter because it lay within the cultivated zone led me to cease work there. The problem of the source of Tell al-Wilaya's water unfortunately remains as enigmatic as ever.

The final survey boundary needing comment is internal. Immediately west of the area just described is a large depression known as the Haur Dalmaj. This was already recorded as a perennial swamp in the late nineteenth century (Kiepert 1883), at a time when it must have been supplied primarily by periodic Tigris floods and runoff from adjacent areas of desert. A half-century later the British quarter-inch map series indicated that it had grown substantially in area, supplied by the tails of pump-fed canals that were being rapidly introduced along the Tigris to the north. It continues today, now receiving massive further water supplies from the main drainage canal of the Mussayib irrigation project that has its outlet in the vicinity of site 646. The total area permanently affected is about 150 square kilometers, including broad expanses of more or less perennial water interspersed with the remains of ancient levees and other topographic irregularities. Although the water obviously rises and falls according to the season, an attempt to survey this area in late August 1973, theoretically under the lowest water conditions, was abandoned when I discovered that temporarily exposed areas of the bed of the depression were composed of treacherous and impassable *sabkha* soil. In

the spring of 1975 therefore, survey was continued only to the margins of the standing water. The depression itself must be considered wholly outside the zone of study.

### RECONNAISSANCE SEQUENCE, PROCEDURES, AND EFFECTIVENESS

The fieldwork associated with this study took place in four unequal phases, necessarily separated by long intervals. Initially it had seemed possible to plan for a series of campaigns of moderate duration in sequent years. The first, lasting from late October through December 1968, led to the recording of 389 sites northwest, northeast, and southeast of the Oriental Institute's field headquarters at Nippur. This led to a heightened awareness both of the overwhelming abundance of Sasanian-Early Islamic surface remains and of the considerable uncertainties surrounding the ceramic chronology of these periods. Hence the remainder of the first season was devoted to a stratigraphic sounding in a small site occupied during those periods, to provide an improved typological sequence with which to undertake the further reconnaissance that was expected to resume the following autumn (Adams 1970).

A few months later, however, a formal application to continue the reconnaissance was denied. I devoted several ensuing years to research on other themes and to a University of Chicago administrative assignment. During a visit to Baghdad in early 1973 I once again obtained an approval in principle. A very brief second campaign was thereupon conducted in late August and September 1973. My intention to penetrate certain swampy areas north of Nippur during the season of low water proved unfeasible, but some of the procedures needed for a more systematic reconnaissance were elaborated. An additional sixty-seven sites were logged in areas northwest of Nippur and north of Tell Abu Salabikh. Administrative responsibilities precluded continuation of the work for longer than a few weeks, but on this basis plans were laid for a major resumption in the succeeding academic year.

There were moderate further delays, and for a time it appeared that the Iraqi authorities might once again rescind the needed approval. Ultimately, however, the third and longest phase of fieldwork got under way in early February 1975 and continued through May. Temporary field camps were established in a succession of places indicating the wide geographic coverage to which this campaign was devoted: initially the German expedition headquarters at Warka, then sequentially in the towns of Rumaytha, Diwaniya, 'Afak, and Na'amaniya. In all, 707 sites were recorded, although in this as in the preceding cases the number of provisional listings was slightly modified by later analysis.

Finally, about a fortnight in December 1975 was exclusively devoted to certain methodological problems for



which further field data were needed. Several additional sites were recorded that had been overlooked, but the bulk of the effort was devoted to sampling procedures and to intensive collections from many of the small pre- and protohistoric sites. This activity was limited to what could be accomplished within a day's journey from the base at Nippur, and thus it coincided for the most part with the area initially surveyed in 1968.

The breakup of the work in this unforeseen fashion had several important consequences. In particular, succeeding phases embodied improvements in method and theory that had been worked out during the interim. In 1968, for example, I had not yet made the acquaintance of any of the diverse and promising formal approaches to locational theory. Until after the end of the reconnaissance that year, moreover, I did not have access to the clarification of the Sasanian-Islamic ceramic chronology that stemmed from the excavations at Tell Abu Sarifa in the months immediately following. By the 1975 season similar improvements were also available for the protohistoric ceramic chronology as detailed in Appendix A to chapter 3.

To some degree, these and other cumulative improvements were retrospectively applied to the initial findings during the final phase of methodologically oriented fieldwork. However, this was necessarily limited to a relatively small number of sites, and particularly to those in the pre-/protohistoric and Sasanian-Early Islamic periods. There remain many sites to which somewhat different dates might have been assigned had they been visited in 1975 instead of 1968 or even 1973. Those for which this seems most likely, either on the basis of entries in the original notes or on the basis of restudies at adjacent sites where similar original datings were later modified, have been more or less tentatively corrected in the site catalog and in the relevant tabulations. But some differences based on sequential changes in the dating criteria obviously remain.

There is another consequence of the repeated, involuntary setbacks to the research schedule that is less obvious but no less important. Uncertainties surrounding this program of archaeological survey varied in intensity but were always present. Apart from serving as a brake on long-term forward planning of the research, these uncertainties tended to place a premium on rapidly completing at least an initial reconnaissance of a broad area rather than on applying a more elaborate and time-consuming survey method to a restricted area. That judgment on priorities, dictated by external circumstances, remained uniform over the entire seven years that the field research was either in abeyance or in progress. It had a decisive bearing on the selection of the site-detection and dating procedures followed, with which I now must deal in further detail.

As I suggested earlier, conditions over a great part of the surveyed area did not permit a uniform, gridlike coverage in the search for ancient sites. Belts of dunes and season-

ally filled depressions were the most evident obstacles, but other impediments to rectilinear travel were almost as serious. Sand hummocks that have formed around desert shrubs, for example, have converted much of the uncultivated plain into a surface that is at best rough and often all but impassable. Wind erosion, concentrated along the raised surfaces of ancient levees, often gouges out formations of buttes and steep-sided channels that are even more difficult for a vehicle to traverse than the worst of the hummocks. In places, as in the desert around ancient Isin, which was abandoned only late in the past century, the steep spoil banks and trenches of former canals still act as barriers for considerable distances. As a subjective estimate, less than a third, and probably less than a fifth, of the area within the zone of intensive study was an open desert land surface permitting unimpeded movement and easy site detection.

In the limited areas where the going was good, something approximating a series of parallel traverses was generally carried out, at distances of about 1 kilometer. Different tactics had to be adopted where this was not possible, varying according to both the potential importance of the area to be surveyed and the nature of the obstacles encountered. Two slightly condensed excerpts from my field notes, both dealing with unusually difficult areas for reconnaissance that were also of considerable significance for the data they might furnish on third and fourth millennium watercourses and settlement patterns, illustrate both the general orientation and how it tended to be applied in varying circumstances:

Some description of desert wasteland between Jidr (004) and Bismaya (ancient Adab) is necessary in order to understand the limitations on the physical possibilities of survey in that region. The land surface is extensively carved by wind erosion into badland formations with as much as 30-40 centimeters of relief, making jeep travel virtually impossible in a consistent direction and tortuous under all circumstances. The ancient canals generally survive as slightly raised strips of compacted earth, although roughened into "riffle" patterns by wind erosion and gullied by rain erosion as well. Thus one frequently cannot even follow the canal-strips in a vehicle. Add to this the sand hummocks, and the sheet deposits that may become indistinguishable from alluvial deposits after a few years of rain, plant growth, and compaction. And then there are the dunes, not infrequently rising 5 meters or more and sometimes forming such tightly packed clusters that no inspection whatever of the underlying land surface is possible. [For a representation of dunes in this area, see fig. 32.]

Within the realistic constraints of the time available, I have bulldozed through along the major watercourses, one way or another—particularly the major watercourse running southeast into Jidr. Elsewhere, however, it is just not possible or productive to cover the terrain systematically. Instead, I have picked up the likely-looking loca-



tions for mounds from the air photos and have fought through to those locations as nearly as I can find them, keeping an eye open for other, small or less likely sites on the way. Fortunately, erosive processes are very widespread in this region, while on the whole the mounds are relatively immune to them (because of their cap of sherds). Hence the tells have turned out to be generally distinguishable from this ravaged landscape on the air photos. Site 1315 is an exception, but in most cases one can immediately identify the location of a particular tell on the photos if one can place it within a square kilometer or so. What we are most likely to lose, of course, are precisely the small, early tells like site 1315, but there is just no practical way of digging them out within the constraints of a massively obscured land surface and a relatively brief, one-vehicle operation. Even with quite prominent tells, one frequently has to cruise around in an area, climbing successive dunes for a look at the hollows between them, before a particular canal intersection can be recognized. Small, low, early sites, even if they are not totally obscured, could be picked up reasonably satisfactorily only by systematic low-level helicopter traverses. It's only a vignette, but finding site 1316 from site 1315, being reasonably certain that the discoloration on the air photo did indeed represent a tell, took about twenty minutes of circling. Yet site 1316 is  $250 \text{ NNW} \times 180 \times 3$  meters high!

I assume that I have been able to locate the bulk of the larger sites in the area with the air photos—those exceeding 4 hectares in area and with appreciable elevation. I have no idea how many small sites we may be missing in the region, although, if one tries to judge from the plain north of Fara (ancient Shuruppak) that lies west of this sand country, it appears that this was not a region of intensive prehistoric settlement anyhow.

The second, shorter excerpt emphasizes some of the same themes—in particular, focusing on ancient watercourses as clues to settlement location. It concerns site 1306, an important protohistoric town:

Site 1306 was discovered only after the watercourse to the south of it was confidently transcribed from the air photos as being indeed an ancient watercourse. Now the latter seems in a position to have carried the effluent from the former. Note that there is no evidence of meander-cutting along it, perhaps suggesting that it flowed under deltaic rather than alluvial conditions. But while a subsequent serious attempt was made to detect ancient sites to the south of site 1306, it was wholly unsuccessful—indeterminate rather than negative. Dense dunes and, more important, heavy wind-laid sheet deposits, have eliminated land surfaces on which sherds from low, early tells might be encountered. Tamarisks may have played a crucial role in this and similar cases—growing to take advantage of available groundwater in the coarse-textured sediments of former watercourse beds and then, by their presence, attracting dunes that grow up around their roots. All this was particularly clear south of site 1306. I followed the probable course south for about 5 kilome-

ters, crisscrossing back and forth by compass over where the course was likely to be, and can only say that there is nothing to mark what is seen in the air photo except an unusual concentration of tamarisk.

It should not be thought, however, that omissions in coverage were exclusively confined to areas like these, where topographic conditions made regular gridding impossible. There were subtler but significant difficulties even in areas where dune formations were wholly absent, some of the most insidious of them subject to variables of which the investigator only inadvertently becomes aware. The revisits in 1975 to a number of low Uruk sites that were originally surveyed in 1968, in order to make intensive collections that would aid in more accurate dating, offered one such occasion. Great difficulty was found in relocating some of these, in spite of reliable bearings that permitted the search to begin within 100–200 meters of them. An excerpt from field notes, concerning the restudy of sites 804, 805, and 837, again provides an illustration:

none of them was found in less than twenty to thirty minutes of looking. With a less irregular surface we could have gridded the area more quickly by driving over it, but in these circumstances we had to do so on foot among bushes that were prevailing 20–30 centimeters high. These bushes were not densely distributed, but they absolutely prevented sensing any gradient in sherd density outside an area extending more than about 2 meters in radius from the viewer. And since a sparse surface scatter of Uruk pottery occurred throughout the area, we had to crisscross it on foot until the major concentrations finally were found. I should also note that widespread hummock formation and sheet deposition was beginning around these low bushes, further obscuring the surface. Clearly, it would be quite impossible to duplicate my initial 1968 coverage of this region under present conditions.

When I sought an explanation of this phenomenon, local informants indicated that there had been unusually heavy precipitation in the immediate area during the preceding four winters. This seems to explain the proliferation of desert shrubs and the ensuing entrapment of airborne sand. Even if there is now a termination of that cycle, the effects will continue for some time. The dormant or dying roots and stalks of these shrubs will continue to act as traps for aeolian particles—perhaps even at an increasing rate, if the volume of airborne dust is positively related to a decline in winter precipitation. In short, the uniformity and effectiveness of survey is inextricably tied to local variations in microclimate as well as to more readily perceived differences in gross topography.

It is apparent that survey under conditions like these cannot be exhaustive. Small, low sites are particularly disfavored in the detection process, but even fairly large ones might well be overlooked under topographic conditions

## The Recovery of Ancient Settlement and Irrigation Patterns

that are by no means rare. For the protohistoric sites, which are preponderantly small and which in any case are the most likely to be buried beneath an overburden of later debris, the possibility of substantial loss is especially severe. Thus the need is clear for measures that both minimize the loss and provide some measure of its extent.

Several steps were taken in all phases of the study to increase the recovery rate for protohistoric sites. First, a much more complete record was kept of occurrences of protohistoric sherds (see Appendix A to chap. 3) than of those attributable to any later period. Even single examples on large, late mounds, possibly to be dismissed as only "strays" since many tens of thousands of surface sherds could be seen, were uniformly noted. Their significance will remain to some degree a matter of conjecture, at least until a number of such sites have been stratigraphically sampled to determine whether the major occupations overlie small, early ones. For purposes of this study, I have more or less arbitrarily assumed that three or more early sherds on a site with a heavy later overburden are indicative of an early occupation while only one or two may not be. Second, it became apparent very early that the protohistoric sites tended to cluster in certain areas and to avoid others. Hence I followed the practice of driving slower to increase the intensity of coverage in any area where even a few protohistoric sherds had turned up on later mounds. Third, it was found that sherd distributions around early sites can greatly aid their detection. The mechanism of dispersion is obscure, but it may well involve the cumulative effects of later plowing. Henry Wright's account of the Ur survey in the Appendix to this book mentions the presence in that region of stray clay sickles (attributable to the Ubaid or Uruk periods) in belts 3 to 5 kilometers wide. He suggests that these may indicate the perimeters within which cultivation was concentrated. On the plain between the Tigris and the Eu-

phrates to the north of the Ur region, however, no stray early sherds of any kind were noted at such substantial distances from early sites as this suggests. Isolated examples were indeed seen from time to time on an otherwise empty plain. A process of systematic gridding was initiated in these cases, either on foot or by vehicle at whatever intervals were indicated by the local terrain, and one or more protohistoric sites regularly were found within a kilometer or so. If there is any substance to an unsystematic impression, moreover, clay sickles were found with no greater relative frequency in purportedly cultivated areas away from sites than on the sites themselves. To that it must be added, of course, that on some Early Uruk sites sickle fragments outweighed all other identifiable ceramic categories considered together (see below, p. 124).

A less generalized, more formal step also was taken to assess the efficacy of survey procedures, on the basis of a restudy of a sample of previously surveyed areas. Using a grid of 10-kilometer (100 km<sup>2</sup>) squares in uncultivated areas both northwest and southeast of Nippur, extending roughly from Tell Abu Salabikh to Bismaya (ancient Adab), a stratified systematic unaligned sample (Haggett 1966, pp. 196-98) of one-kilometer squares was drawn with the aid of a random-number table. This sampling design assures a wide dispersion of locations while maintaining randomization within each larger square in order to avoid the effects of possible periodicities in the phenomena being studied. A map of the distribution of the resultant one-square-kilometer plots is given in figure 7. Having designated loci for restudy in the fashion shown, without reference to sites already known within these squares, in December 1975 I attempted to delimit the boundaries of each of them and conduct an intensive re-survey within those boundaries. The results of this undertaking are described in table 2.

To summarize the table briefly, thirteen one-kilometer

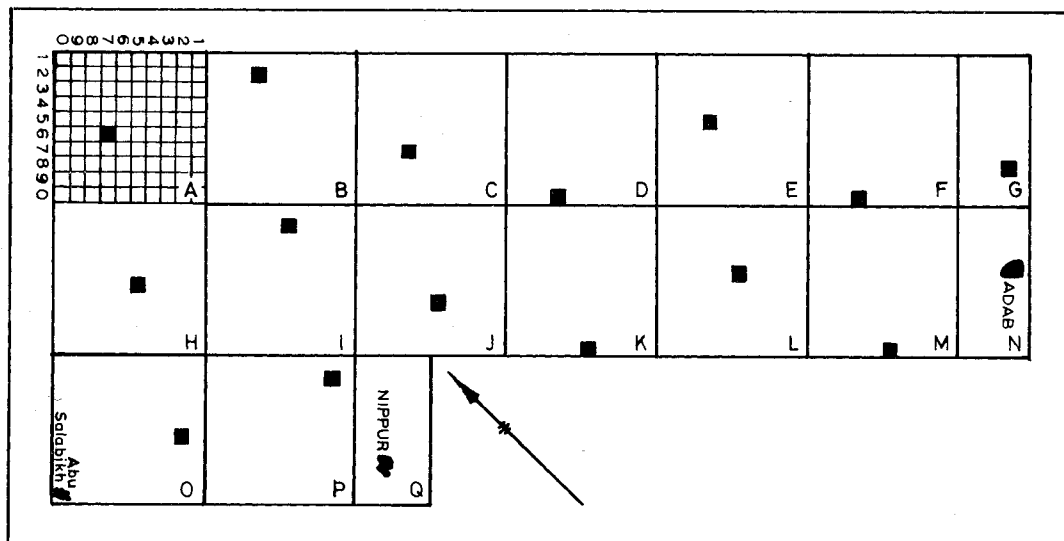


Fig. 7. Sample one-kilometer squares for restudy of survey coverage.

TABLE 2 Results of Resurvey of Sample Square Kilometers

<i>Square A</i>	Topography: Old, stabilized, but very rough hummocks around shrubs. Sites initially recorded: None. Modifications or additions: None.			square; considerable recent wind deposition elsewhere. Sites initially recorded: 1034; only one of two adjacent mounds given this number falls within the sample area. Modifications: Assessment of the major period of occupation remained unchanged, but traces were found of an earlier occupation that had not been noted previously. Additions: A third mound was located 400 m WSW, contemporary with and much smaller than the other two.
<i>Square B</i>	Located within the limits of the Haur Dalmaj (cf. pp. 000–00). Unreachable for survey in 1968 and 1973, or for restudy in 1975.			
<i>Square C</i>	Topography: NW is old, stabilized aeolian deposit around bushy tamarisk, roughened by recent wind erosion; SE is clear and slightly elevated canal levee. Sites initially recorded: 859 immediately adjoins sample area. Modifications: Description of 859 modified to include small NE outlier possibly just within the sample area. Dating modified to include probable post-Samarran as well as the Sasanian–Samarran occupations originally assigned. Additions: None.	<i>Square K</i>	Topography: Low, discontinuous wind deposit, alternating with rough, wind-eroded surface. Sites initially recorded: None. Modifications or additions: None.	
<i>Square D</i>	Topography: Much recent wind deposition. Sites initially recorded: None. Modifications or additions: None.	<i>Square L</i>	Topography: Much low, sheetlike aeolian deposit, small dunes, little vegetation. Sites initially recorded: 1216 adjoins sample area. Modifications: Sasanian–Early Islamic reidentified as the major occupation of 1216, but a small, localized Neo-Babylonian–Achaemenian settlement also found on one end of the mound that had not been noted originally. Additions: A low-lying, early mound found on foot reconnaissance 400 m SE and included within the description of 1216.	
<i>Square E</i>	Topography: Many dunes, much recent wind deposition, including hummocks around sparse vegetation. But obstructions still widely enough scattered to permit thorough vehicular rather than foot reconnaissance. Sites initially recorded: None. Modifications: None. Additions: A small, low mound was identified 400 m NW of 1195. Largely contemporary with the latter and given the same site number, it may also have a small, underlying Uruk occupation.	<i>Square M</i>	Topography: Abandoned cultivation, many ditches; vehicular travel impossible. Sites initially recorded: None. Modifications or additions: None.	
<i>Square F</i>	Topography: Stable plain surface, generally free of hummocks or other wind deposit. Moderate vegetation. Sites initially recorded: 1290, 1291, 1292. Modifications or additions: None.	<i>Square N</i>	Assigned square fell in extremely dense dunes beyond Adab, and hence outside perimeter of study. Not visited.	
<i>Square G</i>	Topography: Numerous dunes, but widely enough separated to permit vehicular reconnaissance. Generally vegetation-free. Sites initially recorded: None. Modifications or additions: None.	<i>Square O</i>	Topography: Old canal levees with sparse vegetation. There are low dunes in N corner of square, but vehicular reconnaissance is possible among them. Sites initially recorded: 904, 905, 908. Additions or modifications: None. As usual with Sasanian–Islamic canals, there is a little scattered cultural debris at intervals along the levees.	
<i>Square H</i>	Topography: Level surface except for small, sparse hummocks. Moderate vegetation. Sites initially recorded: 750. Modifications: Description of 750 modified to include smaller ENE outlier. Dating modified from Sasanian–Samarran to Middle Islamic. Additions: None.	<i>Square P</i>	Topography: Originally scattered dunes and virtually vegetation-free plain bordering cultivation. Recently there has been a massive government-sponsored settlement project covering many square kilometers in this area, accompanied by land-leveling, extensive canalization, and deep tractor-drawn plowing. These conditions precluded a revisit, but in any case small, low sites that were originally overlooked would have been destroyed. Sites initially recorded: 962, 963.	
<i>Square I</i>	Topography: Old, stabilized wind deposit around moderately dense vegetation. Low sites might be completely obscured in the NW third of the square. Sites initially recorded: 838. Modifications or additions: None.	<i>Square Q</i>	Topography: Dense, active dunes bordering cultivation. No sample square was assigned since vicinity of Nippur is uniquely well known from expedition activities and hence unrepresentative.	
<i>Square J</i>	Topography: Dense dunes in SE portion of			

squares were restudied, of which eight were left unchanged. A total of nine sites had been identified during earlier surveys of this area of 13 square kilometers. Three sites were located that had not been recorded originally, one in each of three squares. And the original description or dating of a site was modified in two of these latter squares as well as in two others.

What do these figures imply, not only about the gross order of completeness of the survey as an exhaustive record of surface remains in the area, but also about the nature and significance of the sites that have been omitted? If the proportion of originally recorded to newly discovered sites holds true generally, it appears that the total of 1,605 sites (including 466 published in the Warka survey) may be deficient by as much as one-third. Or one could calculate alternatively on the basis of areas and not sites, adding 3/13 additional site for each of the approximately 6,250 square kilometers that the intensively surveyed area comprised. This would suggest an even larger increment of unrecorded sites, only slightly smaller than the number recorded. However, it is apparent that there is a high degree of clustering of sites along a small number of major ancient watercourses from the northwest that coincide with the area of the restudy. Hence the proportion of omitted sites is likely to be much closer to the former alternative than to the latter.

In fact, even the lower proportion is likely to be somewhat misleading inasmuch as several of the additional, previously unrecorded sites (1195, 1216) lie on the boundaries of one-kilometer squares. Were the squares more rigorously delimited than mere compass bearings and air photographs allow, the number of additional sites found in the sample might shrink from three to two or even one. But the more inclusive approach of counting all of them is preferable. My point in the exercise is not to emerge with a misleadingly precise statistical constant to apply indiscriminately, but rather to illustrate concretely the omissions inherent in a survey conducted under these conditions—and to suggest only very roughly their probable order of magnitude.

Perhaps more significant than the absolute number of unrecorded sites is their character and placement. All were relatively small and low, in fairly close proximity to larger mounds or mound complexes. They argue strongly for the obvious point that sites of moderate to substantial size and elevation are much less likely to be missed. For the later historical periods in which the upper echelons in the site hierarchy play the preponderant part, it appears that the omissions do not significantly distort the aggregate picture of settlement. For the pre- and protohistoric periods, on the other hand, the omissions may well lead to a substantial underestimate of site numbers and a corresponding overestimate of average site size.

These observations can be reinforced and extended by considering the sites for which the restudy suggested mod-

ified descriptions or datings. At two of the four sites, minor outlying mounds were observed that had not been noted previously. Both were contemporary with the larger, neighboring mounds that were originally recorded, and the substitution of different datings reflected only an improved knowledge of the Islamic ceramic sequence stemming from intervening excavations at Tell Abu Sarifa. At the other two, localized early components were noticed that had originally been overlooked. Considered together, these modifications suggest that one can slip too quickly and easily into the practice of identifying a site by its major mound and dating component. Multicomponent sites are common, and more systematic efforts to identify them may in fact be a more economical and effective way to increase the representativeness of survey findings than gridding the entire survey terrain at smaller and smaller intervals. In any case, it again appears that overlooked components, like overlooked sites, tend to be those of very modest size.

The massive ruins of the Warka area furnish a practical example of the difficulties presented by extensive, multicomponent sites. Both around the ancient city and to the north of it, along the broad old levee of the Shatt al-Nil, sprawling low mounds and surface debris are almost continuous. There is an evident temptation, to which it is now apparent that the Warka survey fell victim, to deal with an area of this kind by making periodic transects across it and especially by circling its outer peripheries, where sand accumulations are less dense and the going is generally easier. Such an approach obviously means that one is generalizing from what has been sampled to what is not seen directly. That problem can never be completely eliminated no matter what intensity of survey procedure is followed, and a trade-off of greater intensity for wider extent of survey coverage was in any case an explicit part of the approach that was taken. But one must remember that journeys along the outer edges of ruin fields do not constitute an unbiased sample of them, but instead give an account that overemphasizes the period of maximal extent of settlement.

It has recently been shown that we failed to observe Sasanian remains in the area immediately southeast of the Warka city wall, and both Sasanian and Early Islamic remains along the ancient canal north of the city (Finster and Schmidt 1976, pp. 164–66). The extent and duration of the settlements concerned remain an open question; at least the former one is apparently of considerable size. An effort is made to correct the omission by incorporating the new data in the appropriate period maps accompanying this volume, and it should be clear by now to any thoughtful reader that future discoveries of additional omissions at least as substantial as these are to be expected. But what is important from a methodological viewpoint is that the more extensive scale of Seleucid-Parthian (not to speak of earlier) settlement in and around

Warka probably helped to thwart our identification of these relatively more modest later remains because of an overreliance on search of the more topographic features and along the outer circumferences of ancient settlement.

A final area of concern for the effectiveness of site detection procedures involves the mounds in cultivated areas that have been incorporated into the findings of the survey directly from the files of the Directorate General of Antiquities. In all, there are about fifty-five of these, concentrating in one group extending irregularly north from Rumaytha and a second group southeast of Na'amaniya. A number of additional sites were similarly recorded in the files, in these areas and elsewhere, but are published here as integral parts of the survey since they were independently visited, described, located, and dated. Comparing the findings for these latter sites with the reports in the directorate files provides a basis for establishing the degree of accuracy of the original reports. To what degree do the reports permit an extension of survey coverage into regions beyond its own self-imposed limits?

The answer must be carefully qualified. Individual reports have been assembled by a succession of inspectors who have varied greatly in experience, over a span of more than four decades. Files have been kept on the basis of site name rather than location, and location has almost always been transcribed from existing maps of varying standards rather than independently confirmed with compass bearings. Hence individual sites have been found to be as much as 10 kilometers out of position. The reliance on site names for file designation also produces an obvious concentration on large, prominent mounds for which names can be easily elicited and a corresponding neglect of small, low sites. The reliability of dating assignments is also somewhat variable, although in general—with earlier periods an important exception—the reported periods of major or terminal occupation are congruent with my own findings.

Such selectivity and variability is a severe but by no means crippling limitation on the utility of the files for certain purposes. Named sites are at least placed in their approximate region of occurrence, so that they can generally be found with the aid of a local guide. Viewed as evidence of a regional pattern rather than as a grouping of sites individually conforming to fairly uniform standards of accuracy, the files permit at least certain tentative generalizations about the time of onset of major phases of settlement or abandonment in certain areas. It is in this circumscribed fashion that records on sites not directly visited during the survey are employed here.

#### SITE SURVEY, COLLECTIONS, AND DATING

Previous references to "sites" have perhaps tended to leave the impression that they form a coherent, self-evident category. One might wish that this were so, but it is

not. The recognition and measurement of individual clusterings of ancient debris involves a host of interacting observational variables that frequently cannot be kept separate from matters of subjective judgment.

Density of debris is one important indicator. Randomly occurring sherds or other fragmentary remains may be expected almost anywhere in a region as long and as intensively settled as Mesopotamia. At what point in an ascending scale of density must a particular occurrence no longer be dismissed as insignificant or random but regarded as indicative of an ancient settlement? No attempt was made in this study to establish a quantitatively rigorous standard for this determination, although such a standard is obviously feasible. Its drawback is a spurious imputation of precision and consistency, since like effects can be produced by a wide variety of unlike circumstances. A sparse distribution of sherds, for example, may reflect unimportant "strays," a low occupational mound completely buried beneath a blanket of later alluvial sediments, or perhaps a specialized structure like a police post in which the contemporary use of pottery was minimal. In any case, sparse, widely dispersed distributions were not directly recorded as indicative of sites unless they were accompanied by unambiguous evidence of architecture or mound build-up. Where such distributions were encountered, however, every effort was made—in the vast majority of cases successfully—to identify a nucleated zone of more concentrated debris from which the outlying traces could be assumed to have spread through various forms of disturbance.

Site dimensions raise other problems of uniformity and definition. At one extreme we may think of a "pot drop," a tiny clustering indicative of an isolated, transitory event. Or, even if less transitory, should an area of debris so small that it may stem from a single rural farmstead be given the status of a site? Unquestionably it should for some purposes, but it is doubtful that so minimal a definition will be helpful in a very wide-ranging and preliminary reconnaissance of the kind described here. At the other extreme, after all, are a considerable number of long-lived and important cities that have not previously been identified. Though it is beyond dispute by anyone that they are sites, even these remains of urban size frequently pose their own problems of definition. Their ruin fields, for example, are seldom completely continuous. How do we avoid creating a misleading impression of size and nuclearity by giving a sprawling, vaguely defined area with variable densities of debris a single site number and set of dimensions?

The standards adopted for dealing with this problem were again not made rigorous; in fact they were consciously kept variable. For pre- and protohistoric sites, individually the smallest and the most subject to loss through alluviation and other forms of later disturbance, essentially no clustering of debris was too small to be re-

corded (the problem of "pot drops" fortunately did not arise, since nothing on so small a scale was encountered). For the Sasanian and Early Islamic periods, characterized by vast areas or relatively well preserved but amorphous settlement, small clusterings of less than about 25 meters in diameter were less often recorded independently unless they occurred at a considerable distance from larger settlements or provided a date for associated canal remains. Remains of the third and second millennia fell somewhere between these differing intensities of study—on the whole, rather closer to the prehistoric end of the continuum.

There is seldom a clear demarcation between an ancient mound and the surrounding plain. Quite apart from uncertainties as to the extent of refuse accumulations or outlying habitations around its foot, erosion transports slope material outward for considerable distances if a mound's elevation is substantial. Plowing and canal construction carry the process further. Very commonly the line of a later canal seems to have been sighted on an abandoned mound, with the canal then dug directly through the mound (in spite of the greater labor involved) rather than routed around it. Tending to counteract these centrifugal forces is an uncertain and probably shifting combination of alluviation and wind deposition, both acting to bury the outlying slopes beneath a blanket of sterile material. Without the aid of excavations, therefore, the measurement of a mound's dimensions is useful for relocating it and as an index to its approximate size but should not be taken as an accurate gauge of the area of original settlement.

With the emphasis on maximizing the extent of coverage, I devoted time to preparing sketch maps of mounds or mound complexes only in exceptional cases. More normally, in the prevailing case of an elliptically shaped single mound, I paced the longer axis and merely estimated the shorter one as a proportion of this. I also estimated heights from a position on the plain far enough from the mound foot so that its elevation could be scaled against the horizon. For higher mounds, I took lines of sight toward an intersection of the horizon with the outer slope. I then walked to this point, repeating the process if necessary until the summit lay below the horizon. But while I often relied on horizontal and vertical estimates of this kind, I checked them at frequent intervals (in the latter case also using a hand level) to increase general reliability and minimize any tendency to develop unconscious biases. Obviously, I could have used techniques giving much greater precision. My impression is that the fundamental uncertainties would remain the same, however, and that a substantial investment of time toward this end would have produced a largely spurious accuracy.

Surface examination directed toward dating requires a more differentiated approach. Low sites with relatively brief spans of occupation fortunately predominate in the key pre- and protohistoric periods. But multiperiod

mounds are common, particularly in the third and early second millennia, and frequently involve some lateral movement and transport of materials for building rather than simple superimposition. Digging of foundations, wells, and graves plays a part in churning up earlier materials during the later life of a settlement, and slope wash continues indefinitely to blanket its lower slopes with debris from higher levels. Intensive sampling procedures directed toward eliciting the size of occupation during sequent phases are unconvincing under most such conditions, even when research designs deal exclusively with small sites and relatively limited areas. On the other hand, one can generally identify at least the presence of particular periods of occupation through ceramic "index fossils" (Adams 1965, p. 121), and one often can make some estimate of the extent of occupation at a particular time by noting whether these chronological markers are localized or general in their distribution. This procedure was followed for substantially elevated, multiperiod sites. It involved systematic coverage on foot of all the major areas or components of a site, comparing the evidence for different periods of occupation on each to synthesize a picture of the site's settlement history.

We must again note that the density of surface debris varies widely, on low single-period sites as well as high multiperiod ones. Several factors appear to be involved, seldom having a uniform influence or acting in the same combination. Sheet erosion and slope wash are accentuated on higher mounds, concentrating sherds from the mound's uppermost levels upon an underlying erosion surface as those levels are gradually removed. Wind erosion has the same effect, although the local availability of unconsolidated abrasive material (e.g., dunes) to act as a wind-borne erosive agent probably is more important than mound elevation in establishing the rate of downcutting. In not a few cases the survey encountered a mound fairly soon after it had apparently been crossed by a highly erosive, rapidly moving dune, and we then found the surface littered with complete or relatively complete vessels left behind after the entire topmost layer had been removed. On the other hand, the gradually increasing concentration of sherds on a mound's surface slows its rate of erosion by acting as a protective cap. Similarly, the heavy reliance on baked brick in Sasanian and Islamic times, surely for private house foundations as well as for walls in larger buildings, has greatly slowed the rate of erosion for sites with these as terminal levels. Hence high concentrations of surface sherds on such sites are rare, their sporadic occurrences perhaps indicating no more than a local absence of building activity.

These observations on erosion and dating have a bearing on the methods of estimating mound height that I discussed earlier. To begin with, they suggest that measurements of any kind are likely to be valid only for a limited and uncertain period. This supports my judgment

that efforts at time-consuming precision are on the whole inadvisable. In addition, the volume of a mound is seen to depend heavily on the nature of the erosive processes to which it has been exposed and on the resistance offered by surface materials in different segments. Variable alluviation and wind deposition (or erosion) on the plain surface adjoining the mound further obscure calculations of mound volume. Recently it has been proposed that mound volume offers an attractive approach to estimating population size, by way of uniform assumptions about house volume and duration of use, lack of reuse of building materials, and the absence of significant contributions to volume other than from the decay of domestic architecture (Ammerman, Cavalli-Sforza, and Wagener 1976, pp. 41–53). Each of these assumptions can be seriously questioned in the Mesopotamian case, and the further uncertainties besetting even a rudimentary calculation of mound volume once again render the attempt at additional accuracy largely futile.

No reference has yet been made to recent, purposive human disturbance. Casual surface collecting of sherds and certain other kinds of artifacts, a cumulatively significant source of distortion in many other areas, seems almost unknown in this region. On the other hand, there is an ongoing problem with illicit excavators, perhaps made bold by the desert solitude. Most of their depredations are fairly small-scale and shallow, possibly no more than the idle picking by a passing camel-herder at a partly exposed pot or bones suggesting a burial with offerings. But at least one large, organized gang was at work during the field activities of the survey in 1975. Moving rapidly by truck and concentrating on Early Dynastic and Akkadian sites, it was gutting virtually the entire surface of important towns like site 1188 with thousands of pits dug over intervals of a few days or at most weeks. Ultimately, of course, erosive processes will again do their work and restore a variegated assemblage of surface fragments with which an archaeological surveyor can work. But the subsurface loss is irretrievable. Fortunately, the overall number of sites that have been attacked in this way is still relatively small.

This discussion of sherd densities should not be taken to imply that there is generally a uniform gradient toward maximal sherd concentrations on the oldest sites. It is probably true on the average that the pre- and protohistoric sites have the densest surface sherd assemblages, but there are many exceptions. Low, early tells in cultivated or periodically flooded regions may be submerged beneath a mantle of alluvium, thus suffering no surface erosion at all for an extended period until reexposed by wind erosion of the entire surrounding plain surface. In fact, some sparse scatters of early sherds may not be primary sites at all, but only bits of debris from entirely buried sites that have been brought to the surface by continued plowing or other disturbances.

Most early sites, however, have a uniform surface appearance characterized by relatively high sherd density. This invites a more intensive approach to surface collection and dating. Sites of the Uruk period, in particular, provide access to a crucial and poorly understood chapter in the development of urban civilization in Mesopotamia. Hence observed “index fossils” on these sites were more systematically recorded during all phases of the survey. In the 1975 season, moreover, general presence-absence records were supplemented by intensive, quantitatively recorded collections.

The unit of analysis for most of these intensive collections was a circle of 5 meters radius, drawn by circumscribing one stake around another tied to it by a length of cord. All diagnostic sherds and stone utensils within these circles were collected, separated according to type, and counted. We made one or more such collections on each site, depending on its size, its single- or multicomponent structure, and the time available. In a few cases where density did not permit an adequate collection within this limited area, all the diagnostic material we found was brought together and counted. At other times we recorded only a generalized presence-absence tabulation—for example, when the presence of a later overburden severely limited the amount of early material, or when we had to leave quickly because of dusk or heavy rain. All available counts and tabulations, covering primarily sites first located in 1975 but also a number that were found earlier and revisited for the purpose, are assembled in Appendix A to chapter 3. In the intensive collections as in all others, essentially no materials were permanently retained after I had noted their presence. The request to adopt this procedure was transmitted by the Directorate General of Antiquities representative initially assigned to accompany the survey, both to reduce the burden of storage on Iraq Museum facilities and to retain a maximum number of specimens in direct association with the sites on which they originated. Exceptions were made only for a few highly unusual finds incontrovertibly requiring salvage.

Quantitatively oriented specialists will recognize at once that this is an extremely modest beginning in the use of intensive collecting methods. Work is already well advanced on Uruk sites in Iranian Khuzestan that uses more numerous, rigorously defined variables in an effort to distinguish asymmetrical exchange relationships, centers of regional variation, and patterns of functional specialization among communities (Johnson 1973). Here the primary objectives were more narrowly chronological, to differentiate among patterns of settlement pertaining to the sequent subphases of the Uruk period, although naturally this also implies some extension in our understanding of other socioeconomic patterns (see chap. 3). But, as I indicated earlier, the general approach followed in southern Mesopotamian surveys was consciously



and consistently a contingent one. With prevailing uncertainties as to continuation of the project, the first priority lay with extending the geographical extent of coverage whenever trade-offs had to be made. When and if conditions permit restudies devoting massively increased time to each site, the sites now known in Iraq will lavishly repay the efforts of investigators pursuing the same kinds of questions that are now beginning to be asked on a large scale elsewhere. At that time, too, an extension of the approach from prehistoric periods to the later, better-documented ranges of time that are characterized by great urban centers probably will deserve systematic application.

Initially, in fact, I had planned as a part of this project to introduce a somewhat similar system of recording for Sasanian and Early Islamic sites. This at least might have permitted greater precision in the understanding of spatial and temporal aspects of a social and historical transformation that was almost as important as that occurring during the Uruk period. Because of the subsequent permanent abandonment of so many of these sites, a further similarity to the prehistoric case, I thought it likely that their surface remains would be unusually rich and illuminating for the purpose. But two circumstances combined to defeat this intention. The first was the relative sparseness of surface ceramics in most areas of late sites, for reasons already outlined, so that numbers of sherds adequate for meaningful quantitative analysis usually could not be assembled without increasing the radius of the collecting area to much more than 5 meters—and hence also greatly increasing the time needed to complete work in each collecting area. Second, and even more seriously, the scale of the undertaking turned out to be grossly disproportionate to the resources of a single investigator. There are some 36 square kilometers of Sasanian settlement alone within the intensively surveyed area, more than four times the area of all known Uruk settlements.

The initial compiling of a list of Sasanian and Islamic ceramic markers nevertheless did provide a basis for some refinement in dating. A covariation in the frequency of certain glazed styles, appearing to have chronological significance, was tentatively established as a result of the Tell Abu Sarifa excavations in 1969. That was used selectively during the 1975 season of survey, on the basis of gross counts and rough impressions reached for certain sites as a whole. Perhaps this can identify the terminal ceramic assemblage more accurately, at least when surface material is relatively abundant. On the assumption that this is so, we have gained a few new leads to the disjunctive changes in settlement that marked the end of the Sasanian period, as well as to the accelerating processes of abandonment that appear to have been under way by the early ninth century. But these increasingly become substantive issues rather than matters of survey method and hence are better left for full discussion in chapter 5.

## REINTERPRETATION OF LOWER DIYALA CANAL PATTERNS

Although this study is primarily concerned with the region between the Tigris and Euphrates rivers, the significance of survey findings for that region obviously can be better understood if it is considered in its wider geographic context rather than in isolation. The larger unit of interaction that would be most appropriate, at least for later historical periods characterized by increasingly dense and extensive settlement, is likely to be no less extensive than the whole of the Mesopotamian alluvium. A considerable part of the alluvium unfortunately has not yet received any systematic archaeological surface reconnaissance, especially along the Hindiya branch of the Euphrates and in the swamps adjoining the lower Tigris. To add to our difficulties, both of those districts probably played a greatly enlarged historical role in Early Islamic times. In this respect they contrast sharply with currently available surface evidence, which is drawn mainly from districts where the Arab conquest was followed not by an expansion of the frontiers of cultivation but by their retraction. Lacunae in our detailed knowledge about trends of settlement thus are very likely to introduce distortions into any general reconstructions of historic population trends, at least insofar as those reconstructions are based primarily on the Mesopotamian archaeological evidence.

The plains adjoining the lower Diyala River, east of Baghdad, serve as a source of data with which we can partially circumvent this danger. On the whole marginal and of secondary political importance until the last few centuries B.C., their subsequent place is indicated by the founding there of the Parthian and Sasanian capital of Ctesiphon and, on a still more grandiose urban scale, of Baghdad itself. If the concept of an urban heartland in Mesopotamia can usefully be extended from that civilization's formative era into the past two millennia or so, then for that later range of time the lower Diyala plains would have to be regarded as no longer marginal but instead as constituting a central part of it.

An extensive archaeological reconnaissance of this region has been carried out and published (Adams 1965), and to summarize its procedures or recapitulate the substance of its findings in this volume would be redundant. However, the major and final phase of that fieldwork was carried out in 1957–58. At that time the full utility of aerial photographs for understanding changing ancient canal and watercourse patterns had not yet been perceived; only during later years were the procedures for their study that have been described above gradually elaborated. The older, less-developed method has little effect on reconstructions of irrigation patterns along the lower Diyala before the latter part of the first millennium B.C. at the earliest. Alluviation was relatively much more rapid than on the central floodplain of the Eu-



phrates, and there was no comparable process of Middle and Late Islamic wind erosion to expose long-buried sediments providing traces of ancient hydrographic patterns. But for the later periods the more recently elaborated methods of utilizing aerial photographs hold the potential of providing much new information.

Figure 8 summarizes this new information, in a form reasonably comparable to the base map for the current study. The photographic coverage on which it is based is inferior in quality to the coverage employed for the major part of this study. There has obviously also been no opportunity for iterative improvement of impressions initially derived from close study of the photographs, guiding field-work on that basis and then in turn refining the photographic interpretations with field observations. And one must further bear in mind that the greater part of the Diyala region was once again under cultivation at the time of the original study (Adams 1965, fig. 1), curtailing both photographic and archaeological surface recovery in ways already suggested. But the map given in figure 8 nonetheless permits a substantially fuller interpretation of the later irrigation sequence. While the numbered sites and their locations and dating are identical to those previously published, the new data permit the main stages in the development of the accompanying irrigation system to be much more clearly and unambiguously distinguished. As is discussed more fully in chapter 5, this discloses a number of interesting contrasts between trends of settlement and land use in the oldest urban heartland and those in at least one of the regions that succeeded it in this role.

#### MAJOR LIMITATIONS OF THIS SURVEY AS A SOURCE FOR SETTLEMENT HISTORY

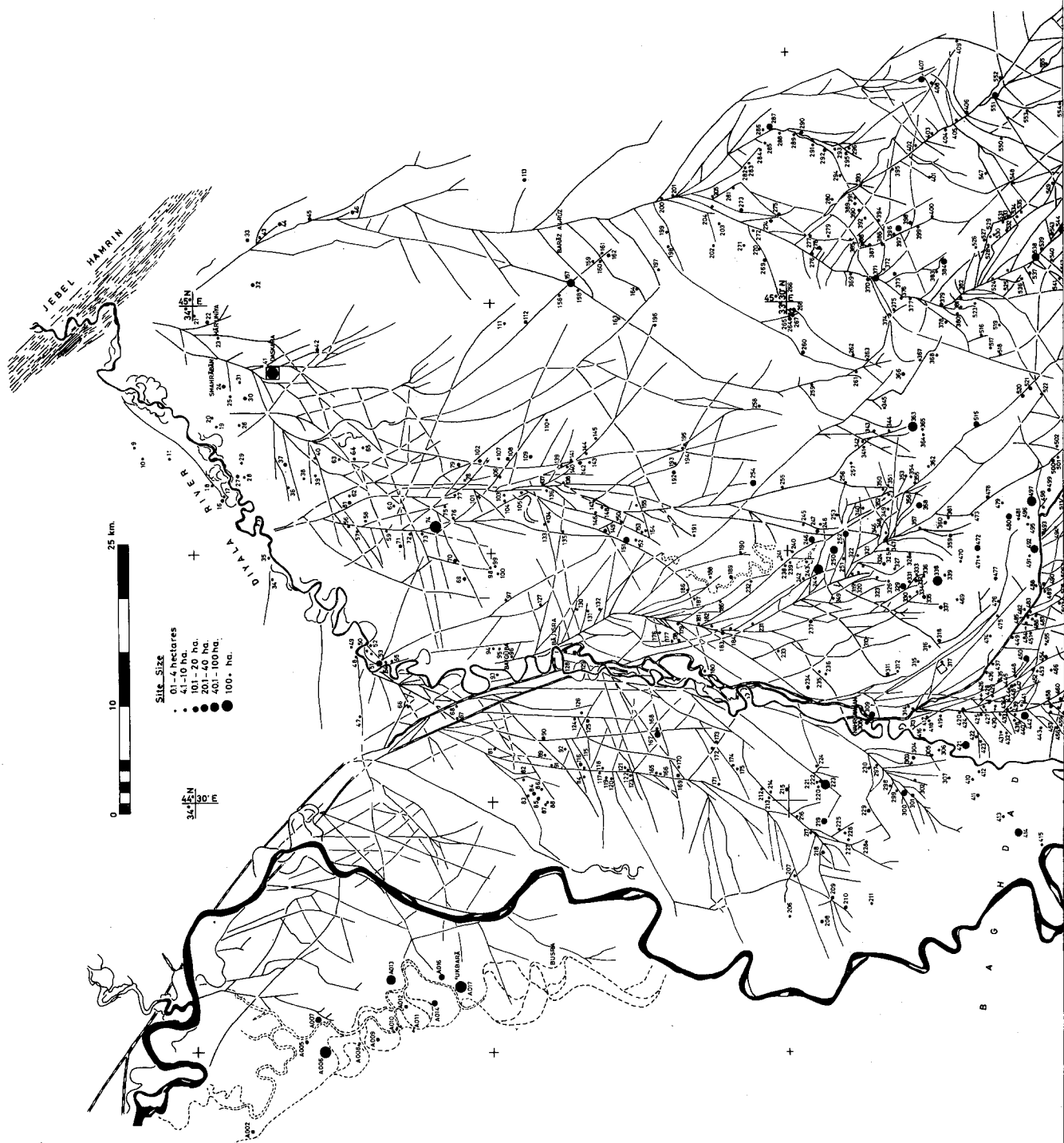
It is perhaps worthwhile, in concluding this lengthy discussion of methodological issues, to draw together what appear to be the principal limitations of at least this type of survey approach. Several that become apparent directly from a description of its procedures have already been suggested. Others will emerge from details given in the appendixes to each of the three succeeding chapters, where the descriptive data on sites and dating criteria pertinent to various periods have been concentrated to permit a more connected flow of narrative within the chapters themselves. And still others, especially those concerning estimates of population size and density and evaluations of the extent to which there was continuity of occupancy at particular sites, appear only when the data are utilized for analytical purposes. The cumulative weight of these considerations, here only briefly summarized, should be evident at once. Together they will constitute, I hope, a sharp, continuing reminder of the provisional quality of much of the synthetic reconstruction that follows. The reader should note, therefore, that this listing of them is intended to obviate the long and tire-

some succession of cautionary or qualifying phrases that would otherwise thickly intersperse the main account contained in the next three chapters.

To begin with the most obvious point, this surface reconnaissance was not accompanied by a program of soundings in which inferences from surface collections and observations could be checked and refined against excavated data from a sample of the same sites. Hence it can only provide conditional and unsystematic confirmation for the more or less plausible hypotheses generated from it. But, while that is unavoidable, it should not be a deterrent to further consideration of either the hypotheses or the supporting data. What is involved is a view of scientific investigation not as a pristine discovery of certainty but as a cumulative, unfolding process in which the testing of hypotheses and the search for new data are closely linked. Very few new findings of any kind are immutable and decisive. We engage in the collective, and therefore (in principle at least) cumulatively self-correcting act of pushing back the frontiers of contingency that constrain knowledge—only to discover that the contingencies and constraints assume new shapes as they recede before us. A survey approach, in other words, differs not in kind but only in degree from the promises and limitations of all other approaches available to the archaeologist or ancient historian.

A second more considerable problem is raised by unsystematic aspects of the data base to which detailed reference has already been made. Continuing uncertainties as to the future of the operation dictated an emphasis on a broad-ranging preliminary investigation rather than on exhaustively detailed gridding of small areas, and differences in coverage also arose from the incidence of cultivation and from the many topographic irregularities. Still another problem of the same kind stems from the fact that the work had to be conducted over a seven-year period, during which there were some cumulative improvements but perhaps other subtle shifts in method or perception that took place too slowly to be noticed and that might have been avoided had it been possible to complete the investigation without interruptions. Greater emphasis from the outset on systematic sampling and exhaustive record-taking would have reduced these biases, but it would not have eliminated them. Moreover, a greater investment of time in sampling and recording could have been made only at a sacrifice in the extent of coverage. That trade-off appeared, and still appears, injudicious in the circumstances, but it does undeniably qualify the completeness of the findings.

Third is the silence with regard to function that characterizes most of the data. Surface indications support an occasional suggestion about specialized activity at a particular site—for example, walled enclosures that may have served as fortified khans or storage facilities, sites preponderantly composed of the debris of glass- or brick-



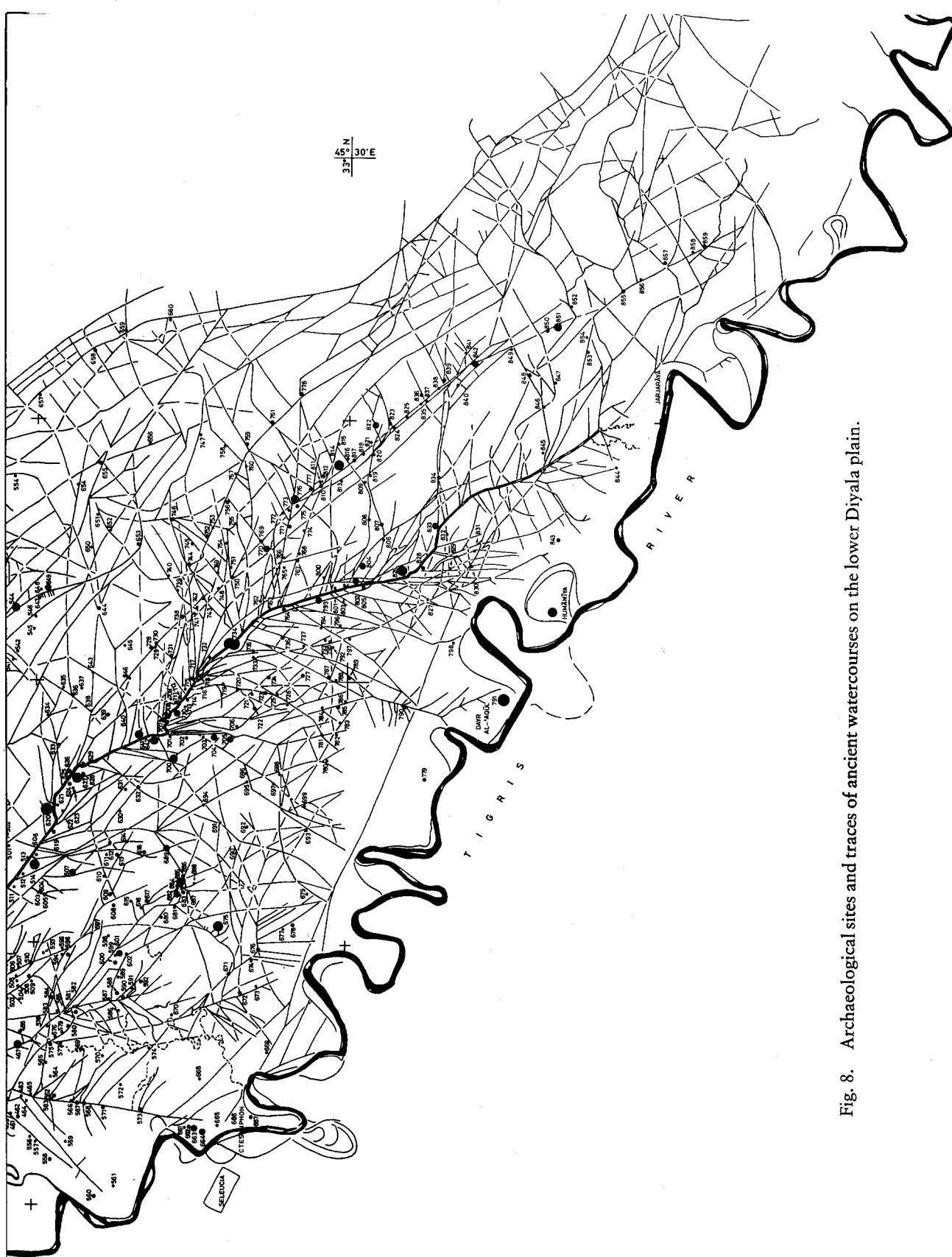


Fig. 8. Archaeological sites and traces of ancient watercourses on the lower Diyala plain.

making, clay cones suggesting wall mosaics on early public buildings, remains of pottery kilns, or unusual concentrations of chipped stone tools. But such observations pertain to only a tiny minority of the sites cataloged in chapter 7. Were the remainder undifferentiated as to function, or differentiated in no important respect but that the larger ones contained progressively increasing proportions of nonagricultural specialists? This seems hardly likely, which can only mean that the available data leave us ignorant of many differently specialized communities. The tendency exists and must be resisted, as a consequence, to see a homogeneous field of autochthonous, agriculturally oriented cells, rather than the web of supra-subsistence interrelationships by which the whole regional structure was articulated.

Fourth, the specialist will no doubt note cases in which the ceramic and other dating criteria relied upon throughout this study do not correspond fully with the temporal units into which the analysis is divided. There are references to a number of these apparent discrepancies in the appendixes to chapters 3, 4, and 5, and others will surely appear from time to time as a result of newly published—not necessarily the same as recent—excavations. It is frankly rather unlikely that a whole set of typological features, sufficiently large and popular to identify a phase of settlement history in surface collections, should have exactly the same times of origin and disappearance. Even where that may have occurred, as with the advent of mass-production methods in protohistoric times and again during much later periods of widespread diffusion or experimentation affecting new decorative techniques like glazing, the correspondence of typologically defined periods with periods demarcated on largely political grounds is still less likely. Surface dating criteria must be recognized for what they are: hypotheses, of a plainly approximate and provisional character, whose justification rests partly on the currently available findings from stratigraphic excavations and partly on the meaning and coherence that particular criteria seem to introduce into the interpretation of changing settlement patterns. Ultimately, we can retain only those criteria that are definitely found to correspond to a single temporal unit or that still are useful for some purposes even though they span two or more such units. The test in the long run, in other words, will come only with excavations.

But not just any excavations, I hasten to add. Particularly in historic ranges of time, Near Eastern archaeology still sometimes involves work of depressingly primitive standards. Since there is widespread reliance on local pickmen with inadequate numbers of supervisors, full quantitative control is very often not kept over sherd frequencies. "Full" recording (subject to the skill and attentiveness of the pickman) of whole vessels and complete profiles is emphatically not an adequate substitute, since it generally leaves us unaware of differential patterns of

breakage and discard in antiquity. Worse still, in the absence of careful, continuous control it is often not possible to distinguish ceramic assemblages that are reasonably likely to represent a single period of use. Debris along an ancient floor meets this qualification. Sherds that may have been included in collapsed walls above such a floor do not, nor does material associated with floors that have been badly cut by intrusive pits. The spade, not the surface collection, is ultimately the arbiter of the sequence, but only when certain minimal standards have been met. Until that time, and explicitly disregarding reports that convey a subjective and unverifiable impression of the standards as well as the findings of excavations, the dating hypotheses that occasionally have had to be introduced in this study may well continue to be as valid as any other.

A fifth area of difficulty involves our inability to deal with settlement size except in the rather gross terms of physical dimensions of sites. Population is the index whose variability we seek, and we can indeed reach crude approximations if assumptions about constant density are applied to site dimensions. But available demographic findings from the modern Middle East make it clear that densities are not at all uniform (cf. below, chap. 4, n. 1), without establishing what archaeologically recognizable factors can explain the variability. Density in private dwelling areas may increase with increasing population size, for example, but this effect can well be completely reversed if monumental buildings and public spaces are disproportionately concentrated in the larger urban centers. Further complicating the problem, at least under Mesopotamian conditions, are local differences in alluviation and erosion that affect site surfaces. Calculations based on sherd densities might appear to be a useful refinement of population estimates dependent on site size alone, but in fact the density of debris appears to be largely dependent on natural processes subsequent to a mound's abandonment. Hence we are left with hierarchies of measured site sizes that surely have some relationship, but not necessarily a very useful one, to hierarchies based on ancient populations. Any discussion of breaks or tiers in hierarchies of central places, an important analytical element in many formal approaches to the interpretation of survey data, must take place through this screen of imprecision.

Sixth, ambiguities of a different kind are inherent in deriving ancient population estimates from archaeological survey data. Insofar as the recognizably distinctive sets of dating criteria that have been employed do not define a sequence of periods of uniform length, it is an open question whether the population estimates made from recorded areas of occupation during each of them are directly comparable. At the extreme, for example, would the total population of fifty sites aggregating five hundred hectares of settlement that were occupied during (unknown, presumably different) portions of a five-century

span really be equivalent to the total population of sites of approximately the same surface area that can be assigned to a one-century span? Or, to introduce another facet of the same question, does a population estimate for a given site that is derived from the maximum area it attained during an unknown, possibly brief portion of a five-century period correspond as closely to the average population of that settlement over the whole half-millennium as it would if the known period of occupation were limited to a century? The answer, in both cases, is probably not. For the group of fifty sites, it is not unreasonable to suppose that there would be less simultaneity of occupancy during the longer, half-millennium period. Some sites are even likely to have succeeded others that had been abandoned earlier in the same interval, so that their inhabitants would be "counted twice" in estimates of regional population.<sup>1</sup> For the single site, whose population also presumably varied with time, lengthening the period would similarly tend to increase the difference between its maximum extent of occupation and the average. These considerations recently have been carefully reviewed by Harvey Weiss (1977, pp. 357–59), who concludes that they require standardizing the length of the periods in some way if accurate assessments of population trends are to be made.

While he is probably right in this general prescription, the weakness of the available data makes the course he advocates difficult to follow. Periods assignable to groups of dating criteria (that in any case waxed and waned individually in frequency) are notoriously difficult to date without large margins of arbitrariness and uncertainty. Unrealistically "uniformitarian" assumptions are implicit in any attempt to standardize period lengths, and these are at times directly contradicted by the historical record. In particular, they often lead to serious underestimates of regional population densities that were at least briefly attained during some very long intervals like the Seleucid-Parthian period (see below, pp. 196–97). A less rigorous procedure than Weiss advocates accordingly seems more reasonable, at least for the present, in which it has been

possible in most cases to designate periods of roughly similar length but in which period length is not otherwise taken into account.<sup>2</sup> Some further series of corrections ultimately may be necessary, if and when it becomes apparent that the successive sets of dating criteria used here are identified with periods of widely varying length. But for the moment it seems possible only to acknowledge explicitly the difficulties that may lie in this direction, and then to set them aside for later study.

Finally, as discussed in greater detail in the appendices to chapters 3, 4, and 5, chronological grossness is an important barrier to improved understanding that simply cannot be overcome at present. In most cases the available data do not permit us to place a particular surface collection in a span narrower than something on the order of ten human generations. To speak of processes of historical change within such a constraint is to deal with changes so slow and amorphous that they may have entirely escaped the conscious notice of individuals taking part in them. Changes visible in settlement patterns therefore constitute a set of phenomena that in most periods are almost entirely disjunctive from the phenomena with which historical and other written records deal. But to that the archaeologist is justified in replying that they are no less "real" for the lack of any felt and communicated sense of immediacy. To be sure, he must avoid unconsciously imposing a "gradualist" bias upon his findings—for example, the assumption that site occupations were generally stable and population trends consistent over long periods simply because he cannot easily detect volatile, quickly reversible patterns. But there is also no inherent hierarchy in which immediate events take precedence over systemic processes that penetrate more deeply. The task of historical synthesis, as Braudel has persuasively shown, is one of working vertically through a succession of superimposed strata: the enduring, the slowly changing, and only last the evanescent flux that dominates the minds of protagonists of a passing generation or moment (Braudel 1972, 1: 20–21; 1973, p. ix).

# 3

## Urban Origins

*(Ubaid–Early Dynastic I Periods)*

The emphasis now shifts from environmental and methodological considerations to an analysis of the primary record of human settlement on the Mesopotamian floodplain. It is important at the outset, however, to note once more several prominent themes of earlier chapters that we must continue to take into account as the focus of interpretation changes.

To begin with certain features of physical geography, the present serves as a guide to the ancient past only in an exceptionally limited way. The courses of the rivers have moved repeatedly and are surely continuing to do so, though modern technology probably can rectify or even forestall major, disastrous shifts and limit most future change to slower processes of meander-cutting. Since the entire plain is composed of silts, differentiated only by coarseness or fineness of texture, there is absolutely no reason to assume that the major courses or branches of today have any close relationship to those of earlier periods. The only basis for defining the latter, then, is what can be empirically demonstrated through historically oriented investigations of soils, landforms, or, as in this study, the remains of ancient settlement.

Similarly, even the physical limits of the plain are a matter on which the present provides no reliable guide to the past. Earlier assumptions that one could reconstruct the past by assuming a regular rate of infilling at the head of the Gulf, and a correspondingly steady rate of advance in the land available for human settlement, were shown a generation ago to be simplistic in their failure to take into account the inherent tectonic instability of the Mesopotamian geosyncline. More recently, the supposed effects of such instability upon post-Pleistocene landforms have been cast into doubt, but in a context that stresses the complex interactions of many other factors and so provides no encouragement for a return to the earlier assumption of smooth and easily calculable regularity.

But if the layout of physical features in earlier periods bears no necessary relationship to that of the present, the ecological, hydrologic, and geomorphic processes that can be observed at work only in the present are crucial for understanding the past. The dynamics of stream flow, levee formation, and soil salinization must have been implacably the same in every premodern epoch, permitting only modest human moderation of their effects and in the main imposing a relatively fixed set of requirements and periodicities on agricultural and urban life. The processual perspective that emerges particularly stresses the need for cultural adaptations to risk and uncertainty connected with both land and water supply. Much of this must always have been perceived as environmentally imposed and outside human influence—disastrous floods and water shortages, channel siltation and subsequent deflection away from settled areas, loss of productive fields through the rise of saline groundwater into the root zone. But in a deeper sense, as we have seen, the dangers confronting human societies in the Mesopotamian setting are not to be understood solely as external impositions of the environment. Instead they are in important respects products of long-term interaction of those societies with the environment, in which dangers or deleterious changes, traditional subsistence practices, institutional forms, and environmentally constrained decision-making compose an interacting web of cause and effect.

A second finding that must strongly tincture the analysis that is to follow runs in a direction that may initially seem somewhat contrary to the first. There is a broad plasticity or substitutability among viable adaptations to the conditions imposed by the Mesopotamian climate, soils, vegetation, and river systems, and there is every reason to expect not only that alternative adaptations coexisted in different parts of the zone but that they fluctuated widely in their respective importance.

Large-scale irrigation agriculture, "dense" not only in the population it could support but in its managerial and capital requirements, accordingly should not be regarded as the historic culmination toward which some sort of inner logic or driving force led the whole system to evolve naturally. Inherently complex and lacking ecological resilience, it appeared relatively late in the historical record. Even when it did appear, it did not eradicate alternative forms of adaptation but only predominated for a spectacular but relatively brief interval. x Pastoralism, a way of life devoted preponderantly to herding, was of course the other extreme of the continuum. Within the Mesopotamian plain itself, it was generally relied upon only by relatively small, marginal groups except during certain "dark ages" of political dissolution. Much more important were a variety of adaptations stressing a shifting balance of husbandry and cultivation, for they could usually support far greater numbers than unadulterated pastoralism while maintaining, at the expense of some loss of productivity, greater long-term resilience than specialized cultivation. The seminomadic, "tribal" units pursuing these shifting patterns may frequently have had centrifugal, antiurban tendencies, as when they can be observed in most convincing detail in the nineteenth century. But however effectively they were incorporated within larger, urban-centered polities, they remind us of the range of adaptations that was always possible.

Another way of taking cognizance of the long-continuing range of subsistence and social variability is to emphasize the region as the unit of this analysis. Archives and monuments that are concentrated in the major towns foster a predisposition to begin with a particular site or city as the paradigmatic unit, viewing its hinterlands only as they sustain its life processes as an independent organism. Here the quite different starting point is a sequence of patterns of settlement in the countryside, geographically bounded by the disappearance of those patterns beyond the limits to which irrigation water could be conducted in order to sustain an at least briefly sedentary community. This difference in perspective does not negate the importance of cities as organizational and power centers and as the principal loci of most forms of cultural initiative. But placing them in a regional frame of analysis lays greater stress on cities, towns, villages, and encampments as they compose an interacting system, fluctuating in size and prosperity and relying upon different parts of the spectrum of subsistence resources not wholly by independent choice but at least partly as an outcome of their changing relations with one another.

The existence of diversity with regard to subsistence adaptations is paralleled by similar diversity in topography and geomorphic processes. In the traditional approach, alluviation has been seen as a uniformly dominant if not necessarily constant process. Upon closer inspection

this idea requires replacement, as we have seen, by a picture including a complex, sometimes slow and sometimes very rapid, array of erosional as well as depositional processes. The locally variable outcome of these processes, which was often in evidence but impossible to record in detail during the course of a rapid, wide-ranging archaeological surface reconnaissance, introduces unmeasured but presumably large uncertainties into the findings of that reconnaissance. This must have some effect on estimates of site areas, since in different circumstances greater or lesser proportions of the sloping lower flanks of mounds would be buried and hidden from view. More vulnerable still is the proportion of originally existing small, low sites that can be found and recorded with present survey techniques. As I noted earlier in connection with a restudy of small prehistoric sites in the Nippur area, even local wind deposition owing to a few wet years with correspondingly rapid plant growth can have a very adverse effect on the rate of site recovery.

Uncontrollable variation in the quality and quantity of data recovered is a problem not limited to archaeological surveys. Short of exceptionally costly and time-consuming programs of sampling, it extends with almost equal force to archaeological excavations. A variant of the same problem can be said to lie at the root of most controversies over the use of ancient textual sources for the reconstruction of broad patterns of belief and behavior. There is also much truth in the response that the basic features of a pattern can often be recognized even when a very large number of elements are missing in the totality.

But in the present context this unevenness of data must still be recognized as a deterrent to the use of analytical approaches that elsewhere have proved very useful. If a higher proportion of small than of large sites may have been lost in some areas, for example, then differences in the proportion of small to large sites are highly suspect as data. Yet in classic central place theory, evaluations of the relative importance of "market," "transport," and "administrative" considerations depend on those proportions in no small part. Again, the use of Thyssen polygon techniques to generate bounded spatial units suggestive of ancient territorial patterning is also compromised, since the unsuspected omission of a larger center (or its conversion to a settlement of significantly lower rank) can produce a quite spurious outcome. Similarly, nearest-neighbor analysis, potentially useful in providing coefficients of relative settlement clustering from measurements of distances between sites, is of doubtful validity when the proportion of sites from which such measurements can be taken varies uncontrollably. These are among the formal locational approaches to the study of archaeological settlement patterns that in other circumstances have begun to provide important insights not merely into systems of land use but into questions of social differentia-

tion and administrative hierarchy (cf., e.g., Hodder and Orton 1976; Flannery 1976). But greater hesitation seems justified in applying them here.<sup>1</sup>

Finally, constraints on locational studies of another sort are imposed by a feature of the settlement history of the area. The major early centers tended to be very long-lived, having originated in the fourth millennium B.C. or earlier and in most cases surviving at least into the second. Within the limits of a brief reconnaissance, multi-period occupations of this kind make estimates of size at any given period frequently unreliable if not wholly impossible, save for the terminal occupation and in some cases perhaps also an earlier, more widely extended one. Hence many of the data on the sizes of the key central places around which the early urban settlement system was organized are impressionistic or speculative. Obstacles to completeness or precision in this respect seriously undermine efforts to appraise the institutional correlates of the settlement system on the basis of its urban hierarchy.

### ONSET OF ALLUVIAL SETTLEMENT

The Arabo-Persian Gulf may be described as a very large and long but relatively shallow estuary. Hence the shoreline at its head is peculiarly sensitive to oscillations in world sea level occasioned by climatic changes. Nowhere deeper than 100 meters, the Gulf in fact disappeared entirely as a geographic feature for a time during the late Pleistocene. As recently as about fifteen thousand years ago, the ancestors of the present Tigris and Euphrates emptied directly into the Gulf of Oman, some 800 kilometers southeast of the present mouth of the Shatt al-Arab. By six or seven thousand years ago, on the other hand, the melting of ice accompanying irregular but progressive warming trends had brought sea levels to approximately their present position (Nützel 1975).

As we saw in an earlier chapter, the position of the Gulf shoreline is not so easily established. The earlier argument of Lees and Falcon (1952) that the line of the depression occupied by the Gulf constituted an unstable, subsiding geosyncline was for a number of years widely regarded as persuasive. More recently, however, evidence has begun to accumulate in support of a substantial northward marine transgression after the end of the Pleistocene. It is not yet possible, to be sure, to define the position of the shoreline itself at any given period. But a southward progradation of as much as 150 to 180 kilometers during the last five thousand years or so seems increasingly likely. The assumptions of an earlier generation of archaeologists thus are finding favor once more, even if it is premature to speak of their full confirmation (Larsen 1975, p. 57; Larsen and Evans 1978, p. 239).

It is important to recognize the effect of the large-scale

physiographic changes just described upon early patterns of settlement in the alluvium. In terminal Pleistocene times, under climatic conditions that locally may not have been much less arid than those of today and with a much greater exposed alluvial land surface until the Gulf approached its present position, the whole region would have offered few attractions to human groups. Vita-Finzi has summarized evidence of dune development and the paucity of fluvial sediment on what is now the Gulf floor to contradict the thesis that it must have been a fertile, well-watered plain. He suggests instead that it should be understood as "a generally waterless depression containing a few swampy tracts" (1978, p. 258). The only zone of substantial preagricultural potential for a complementarity of resources permitting year-round subsistence, in fact, would have been the tidal marshes and lagoons concentrated immediately above the head of the Gulf or along its shoreline. Early encampments there would, of course, now be far out on the bed of the Gulf. Moreover, the rapid retreat of the shoreline as the sea level rose would have approached an average of 100 meters per year, although there were intervals when conditions temporarily stabilized. This means that most encampments of hunter-gatherers could have remained in place only for a relatively short time rather than being returned to seasonally.

The retreating Gulf shoreline must have reached its northernmost limits in early post-Pleistocene times, and the southward progradation that then ensued was surely a much slower process. By around the sixth millennium B.C., in other words, conditions favoring permanency of nonagricultural settlement in regions accessible to archaeological inquiry markedly improved. This was roughly the same time that the advent of irrigation permanently transformed subsistence patterns.

Although this reconstruction is based exclusively on geological data, it accords well with the available archaeological evidence. Settlements in the alluvium proper that antedate the mid-sixth millennium or so have not yet been found, and the earliest ones appear to cluster in the extreme south of the plain, close to the putative position of the shoreline. The terminus post quem for this study is thus a fairly firm one of about eight millennia ago. And it is noteworthy that the changed conditions responsible for the onset of settlement had less to do with some advance in man's organizational or technological capabilities than with conditions largely or wholly beyond the control of human societies.

In archaeological terms, the time of onset of human settlement can be said to coincide roughly with the Ubaid period. That period as usually defined is excessively long and somewhat heterogeneous, its identification resting largely on a succession of painted pottery styles whose common elements are not altogether apparent. Hence the practice followed by some authorities (including



Henry Wright in this volume) of referring to Ubaid I and II as the Eridu and the Hajji Muhammad periods may well be preferable. In any case, most excavated samples from within the alluvium pertaining to the Ubaid I–IV or Eridu–Hajji Muhammad–Early/Late/Terminal Ubaid range were obtained a generation ago, before important advances in excavation technique and the development of interest in floral and faunal remains and other non-artifactual materials. It does seem reasonably clear, however, that the material spans most or all of the fifth millennium, the crucial range of time in this regard, with a few of the earliest known settlements apparently showing greater affinities with the preceding Samarran period and perhaps extending back as far as the middle of the sixth millennium.

The known sites for this very long span of time are plotted in figures 9 and 10. Most of them seemingly were occupied only for part of it, although detailed information is available on so few that no attempt has been made to specify subphases at particular sites. Particularly when we consider the high probability of prevalingly sequent rather than simultaneous occupancy, the dominant impression is of extremely low population and settlement density. That impression needs qualification, to be sure, on the basis of regional differences in the available data.

As I described more fully in chapter 2, the data are probably most deficient in the region of ancient Akkad, the northern part of the alluvial plain between the Tigris and Euphrates (Gibson 1972; Adams 1972). Much of it was surveyed before aerial photographs were available. Widespread cultivation interfered with survey coverage, which in any case was rendered less effective by heavy, recent alluviation. Notes and photographs of the original collections have been reevaluated in the light of more recent dating criteria, but what was not originally recognized as a potentially significant type for dating and hence not collected is of course not available for reassessment. A glance at figure 9 conveys a graphic impression of the sparseness of known pre- and protohistoric sites to the northwest of Tell Abu Salabikh, in the Akkad region, in comparison with more recently studied areas to the southeast. Since at least in immediately adjacent areas conditions must be approximately the same, it is evident that a substantially lower proportion of Ubaid sites have been recovered in ancient Akkad.

Northward across the Tigris River are the plains adjoining the lower course of its last major tributary, the Diyala. Ubaid and other pre- and protohistoric sites there are shown in figure 10, drawn from slightly later surveys in 1957–58 that were in turn based on earlier Oriental Institute campaigns in the thirties (Adams 1965). The original designation of what was regarded as Ubaid in this area included certain important types, principally clay sickles, that later were found to be far more numerous and important hallmarks of the succeeding Uruk period. x

What is identified as Ubaid in figure 10 excludes sites for which the original dating criteria now seem questionable, again based on a restudy of the original notes and collection photographs. Here again the existence of a heavy blanket of more recent alluvial sediments is well documented, and extended areas of cultivation were a deterrent to systematic coverage.

Excluding recovery procedures employed in the Nippur-Isin-Adab region that are discussed in detail in chapter 2, it remains to consider the probable proportion of recovery of Ubaid sites in the region around ancient Uruk (modern Warka) farther to the south. In general, as I noted above, reconnaissance techniques were very similar to those employed more recently. A significant exception, however, was that somewhat less time was devoted to systematic collections on the early sites. Whether for this reason or for some other, there is greater likelihood that small numbers of Ubaid and earlier sherds may have been overlooked in the Warka survey. Five Uruk period sites visited initially in that survey were reexamined in 1975 using the newer, more intensive procedures; Ubaid occupations that had not been noted initially were found at two of them (126, 245). The sample is inadequate to indicate by how much the previously reported number of Ubaid and earlier sites would have been increased if all the early sites had been revisited, but clearly the modification in the widely dispersed, sparse pattern that was initially reported (Adams and Nissen 1972, pp. 9–11) might be substantial.

Taking into account these regional variations in coverage, what does the known distribution of Ubaid and earlier sites imply? Acknowledging that the initial impression of very low density needs correction, especially for the region around ancient Uruk, it is still essentially supported by all the available data. To take the Nippur-Isin-Adab area, for example, sparse traces of Ubaid pottery were found only at four widely separated sites (573, 680, 1194, and 1416) out of more than eleven hundred that were recorded. This was an area, moreover, in much of which wind erosion had greatly reduced the effects of subsequent sedimentation, and to all of which the relatively more intensive collecting techniques were applied. When in addition we take into account the very long span of time represented by the early painted pottery traditions, the settled occupation in southern Mesopotamia as a whole at any one time during this span seems likely to have been far less than it ever was subsequently.

We should also recognize, however, that there is significant regional and temporal variation within the general pattern of low population density. First, entirely different conditions obtained along the Zagros piedmont. Significantly higher rainfall there, together with numerous small springs and alluvial fans, offered attractive conditions for early, continuing, and relatively dense settlement. Recent work in the vicinity of Mandali has brought

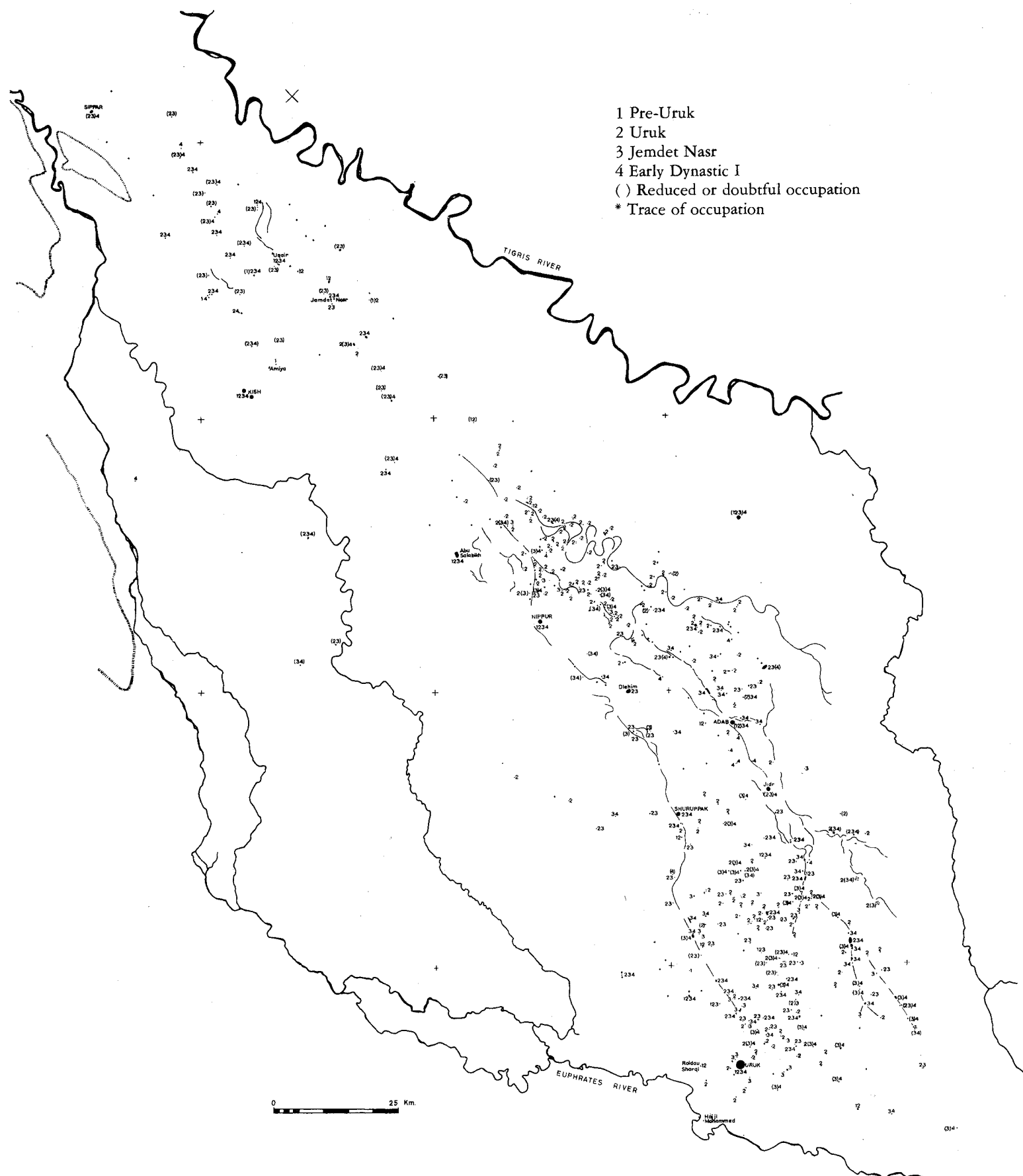


Fig. 9. Pre- and protohistoric sites on the Mesopotamian plain.

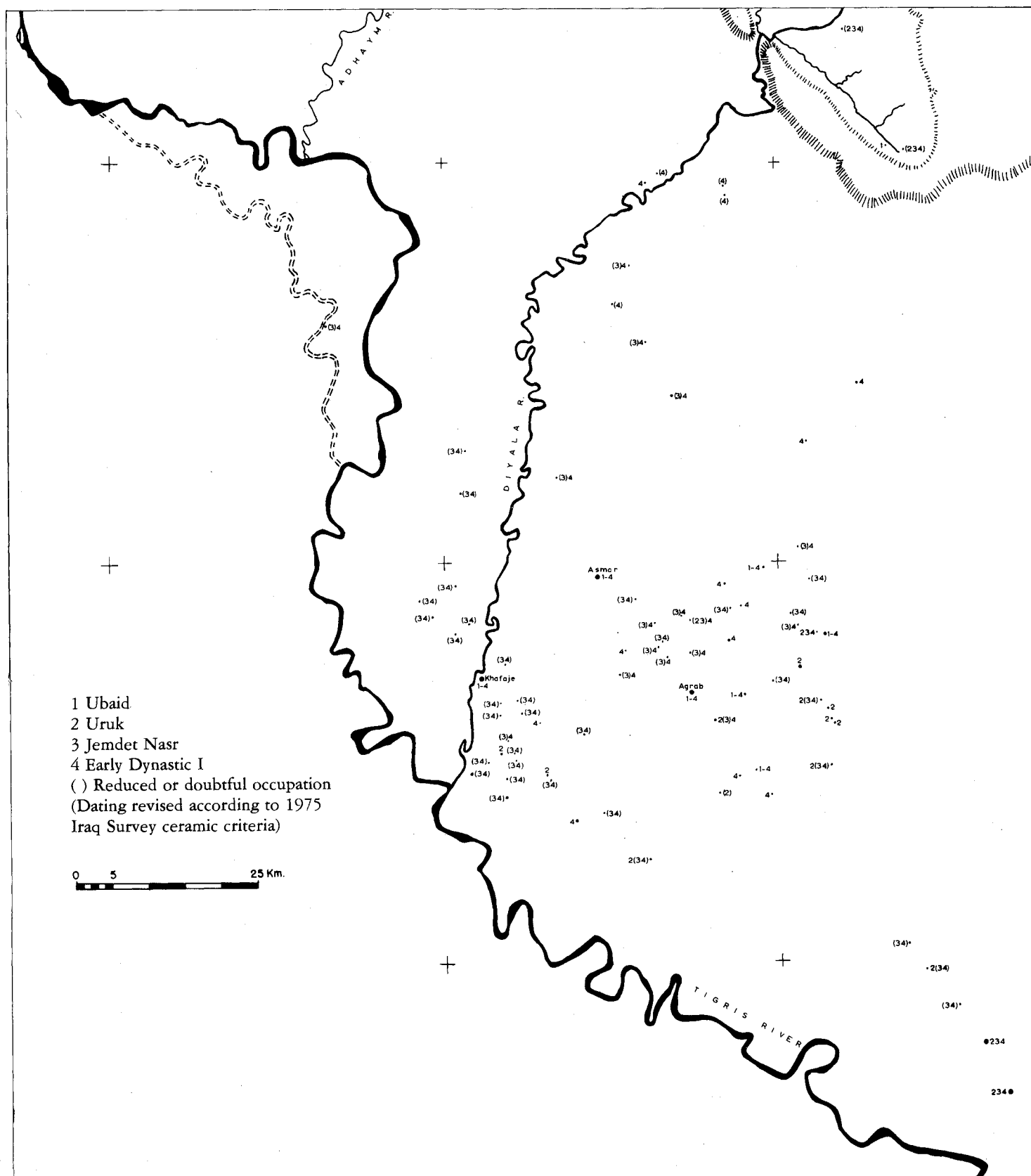


Fig. 10. Pre- and protohistoric sites on the lower Diyala plain.

to light clusters of villages that already had come to depend in part on local irrigation systems by the early sixth millennium B.C., and whose pottery reflects some contact with the earliest known sites in southern Iraq (Oates 1968, 1973; Oates and Oates 1977). This is an important chapter in Mesopotamian prehistory, but one that must be held distinct from developments in the alluvium itself.

There are difficulties of another order in obtaining an accurate impression of differences in population density even within the alluvium. Less comprehensive site recording on the lower Diyala plain and in ancient Akkad may falsely heighten contrasts with the south. But even within the more recently surveyed areas, there is an obvious upward gradient in site density as one moves southward from the region around ancient Nippur, Isin, and Adab into the environs of Uruk. As adumbrated earlier, the oldest known sites are found in the south. Eridu, the best known of them and the type-site for the earliest phase of Ubaid pottery, is very near the southern margin of the alluvium. Two others, approximately of the same age or possibly slightly older, are found a short distance north of Uruk (298 and 1604).

Recognition of the succeeding Hajji Muhammad or Ubaid II phase is complicated because the distinctive painted ceramic style associated with it at the type site and elsewhere apparently continues well into or even through the Ubaid III phase (Oates 1960, p. 36). Hence our finding individual surface sherds exhibiting this style on later sites does not ordinarily permit an assignment to one or the other. But the Hajji Muhammad style, in any case, is better known and much more widely found than its predecessor. It is the first to occur in sites along and behind the Saudi Arabian shoreline, more than 600 kilometers southeast of Eridu. Very recent chemical analyses indicate that the painted pottery there was of southern Mesopotamian manufacture, implying periodic visits by fishermen from settlements along the Tigris-Euphrates delta with craft sufficiently well developed for them to master regular deep-sea travel (Oates 1976, p. 22; Oates, Davidson, Kamilli, and McKerrell 1977).

The Hajji Muhammad style is also more widely represented in Mesopotamia proper. Within the surveyed area it is most concentrated in the Uruk region (042, 051, 178, 247, 267, and 298, as well as Uruk and Hajji Muhammad itself), but it also extends considerably farther north. Definitely attested at a small site directly west of Adab (1416), a single, somewhat doubtful example of the same painted ceramic style was also found within the survey area on a site (1194) at approximately the latitude of Nippur. Fifty kilometers farther north, in the environs of ancient Kish, it is found once more. Hajji Muhammad is an important component of the pottery at the excavated site of Ras al-'Amiya (Stronach 1961), also appearing on the surface as a result of continual plowing even

though the mound itself has been completely submerged by a later blanket of alluvium. At least on the basis of present evidence, however, these are the only occurrences in the northern part of the alluvium as well as on the adjoining lower Diyala plain to the east of the Tigris. Moreover, the northernmost example, Ras al-'Amiya, is probably to be dated in early phase III rather than phase II (Oates 1976, p. 25). And phases III and IV of the Ubaid period are still more widely represented not only in the south, but throughout much of the more northerly region that later became ancient Akkad.

○ This does not necessarily imply that the northern part of the alluvial plain was primarily colonized as an outcome of the slow expansion of the southern centers. Many other sources of settlers lay immediately at hand. After all, one of the Near East's earliest agricultural hearths extended all along the lower flanks of the Zagros mountains of western Iran and northeastern Iraq. But the distribution does suggest that adaptation to settled life on the lower Mesopotamian plains was in an important sense distinctive and independent. It appears to have been initially worked out not far above the Gulf's retreating shoreline, under conditions starkly contrasting with those in the rainfall zone along the piedmont, where irrigation was much less important or even unnecessary.

Several other tentative generalizations emerge from a consideration of the limited number of early sites, most of them having already become apparent in the study of the more limited region around ancient Uruk. The distribution is on the whole fairly uniformly dispersed rather than clustered. Linear alignments suggestive of adjoining ancient watercourse levees are for the most part difficult to elicit. Where they may seem to occur in limited regions, their identification generally depends upon grouping together sites that were not strictly contemporary but were occupied during different periods or subphases.

The frequent presence of heavy overburdens of later debris makes it difficult to generalize about site size. It was noted already in the Uruk region that, excluding Uruk itself, the average size of Ubaid sites not obscured by overlying settlements was almost 4 hectares, considerably larger than in the following Uruk period. One site (Tell Awayli, 460) exceeded 10 hectares in area by late Ubaid times. Taking into account the maximum dimensions of sites with only limited (or deeply buried) Ubaid occupations, on the other hand, it was also clear in the Uruk area that most of them were probably on the order of one hectare or less (Adams and Nissen 1972, p. 11).

The foregoing observations apply to the region covered in the Warka survey, but most of them can be extended northward into the central or upper alluvium with little change. As noted earlier, the apparent density of Ubaid remains falls off sharply. Very widely dispersed rather than clustered distributions become even more characteristic. On the other hand, numerous Ubaid surface cer-

amics at sites like Nippur argue that Uruk was not alone in having been a substantial town by that date. Tell 'Uqair, whose size in the late Ubaid period is unambiguous, is slightly larger than Tell Awayli (Lloyd and Safar 1943; Adams 1972, pp. 198–99). Yet, as a group, sites of primarily later date that have a little Ubaid pottery tend to be very small.

These general features present a somewhat anomalous picture. Both the size of some Ubaid sites and the sophistication of excavated examples of public architecture at sites like Uruk and Tell 'Uqair argue that a mature, complex, and successful adaptation had been made to the demanding conditions imposed by a semiarid alluvium. But that is difficult to reconcile with the regularly dispersed character of the settlement pattern and the absence of linear alignments suggesting a riverine orientation. Small, local networks of canals and even more "primitive" enclaves of flood irrigation tend to favor a clustered distribution of small settlements rather than a regularly dispersed one (see fig. 4).

What would have initiated and maintained the dispersed pattern in spite of the prevailing ecological constraints? What would have led to the considerable emphasis on centralization in a few sites, with social institutions sufficiently formal and complex to favor the development of public architecture, in spite of the prevailingly very low density of population? These questions raise the possibility of a major break, a disjunctive step of some kind, between the Ubaid period and what followed. Yet such a break is belied, at least in the best-studied aspects of material culture, by the apparent gradualness of the ceramic transition in the deep Eanna sounding in Uruk (von Haller 1932) and elsewhere, and by the manifest continuities in monumental temple architecture at ancient Eridu as well as Uruk.

To resolve this apparent contradiction, fundamental cultural continuity within the major centers of settlement seems beyond question. But they represent only a part of the picture. Their regular dispersion, and in some cases considerable size, may indicate that they served central place functions—were pilgrimage centers as well as arenas for exchange—for substantial hinterlands. Yet an outlying array of smaller, dependent settlements is admittedly not in evidence. It appears, therefore, that we have been able to identify only the larger, sedentary, agriculturally based components of an interacting system whose members were divergently specialized across the full spectrum of subsistence resources. Around each center we should visualize smaller, less sedentary groups who depended primarily on their herds or on fishing while exchanging some of their specialized produce for the crops produced by the Ubaid townsmen.

Southern Sumer, as outlined in Henry Wright's accompanying study of the Ur region, presents a substantially different picture. Fairly numerous small settlements,

and some clustering rather than a tendency toward uniform dispersal, are in evidence there. Maximum site size does not appear to be significantly different, but there are suggestions of agricultural enclaves in the vicinity of Ur and Eridu whose aggregate populations exceeded anything that can yet be identified farther north. Possibly the pattern of settlement around Warka was somewhat closer to this than the brief schematic description just given seems to imply, particularly if we take account of the supplementary Ubaid remains noted on resurvey of a few sites in 1975. But a substantial attenuation in site density does seem reasonably clear as one moves northward from the southernmost margin of the alluvium.

One explanation for this contrast might be that the initial subsistence adaptation based on irrigation agriculture was indeed quite localized around the head of the Persian Gulf. The greater population density in southern Sumer throughout the Ubaid period would then be merely a continuing reflection of its initial priority of development. The difficulty is that this fails to account for the presence of substantial Ubaid towns well to the north, though only at wide intervals and perhaps only in the latter part of the period. As an alternative, these dispersed towns with few smaller dependencies may suggest that a substantially larger proportion of the population around them depended on pastoralism or other semisedentary activities. While permanent hamlets and villages for the archaeologist to find and record would have been fewer in such circumstances, individual towns might understandably be comparable in size, since the populations in their immediate hinterlands were roughly equivalent. Another alternative explanation is that a much more complete record of the Ubaid occupation happens to be available for the Ur-Eridu region. Wright's impression that the Ubaid remains there are on the whole fairly deeply buried, together with general similarities in survey procedures and intensity, makes this somewhat unlikely. At least within this group of possible explanations, therefore, the alternative involving a less sedentary and presumably more pastoral way of life within the central and northern part of the alluvium is perhaps most reasonable.

To summarize briefly, the onset of settlement is first known from relatively small numbers of sites that trace out a gradient of declining density northward from the head of the Gulf. Over most of the region the sedentary communities were widely and fairly evenly dispersed. Later overburdens of debris, combined with uncertainties as to the rate of alluviation, make size estimates very difficult. While most sites apparently were relatively small, however, at least a few were demonstrably quite large—more than 10 hectares—and were characterized by clear indications of social differentiation and complexity. There is some discrepancy between this evidence of relatively advanced sociocultural institutions, certainly

not lagging behind developments in any of the adjacent, longer settled regions, and the sparseness and dispersion of the visible remains of the population responsible for them. This suggests that the visible remains derive in the main only from the agriculturally specialized part of the population and that other groups of comparable or even larger size were less sedentary. If so, we may doubt whether reliance on irrigation had yet become the basic feature of subsistence that it was in most later periods. Its more modest role might help to explain the length and comparative stability of the Ubaid period, as particularly suggested by the failure of population levels to begin a dramatic rise for more than a millennium and a half. Only in the succeeding Uruk period, at any rate, can we identify the processes of precocious growth that were to lead to the development in southern Mesopotamia of the world's earliest civilization. The geographic roots of that transformation provide the unifying theme of the section that follows.

### MASS APPEARANCE OF SEDENTARY CULTIVATORS AROUND REGIONALLY DIFFERENTIATED HIERARCHIES OF URBAN CENTERS

The Ubaid period probably drew to a close at or soon after the end of the fifth millennium B.C. Its absolute chronology is still obscure. There is a single Late Ubaid radiocarbon determination of  $4120 \pm 160$  B.C. (5,570-year half-life) from the base of the deep sounding in the Eanna Precinct at Uruk (Münich 1957) that is immediately relevant. With the latest correction factor based on bristlecone pine dendrochronology, that is equivalent to about  $5020 \pm 170$  B.C. (Ralph, Michael, and Han 1973)—an age that seems considerably too high for the archaeological material involved. In any case, the sample is technically very questionable. More recent and much more extensive archaeological research on the upper Elamite plains of southwestern Iran is beginning to produce a more substantial and reliable sequence of determinations, but even there the absolute chronology has recently been characterized as being “very poorly understood.” Susa A, partly contemporaneous with the Late Ubaid period, has been relatively securely dated to about 4000 B.C., followed by a Terminal Susa A phase. The Uruk period itself “probably begins in the early portion of the 4th millennium and ends somewhat prior to 3000 B.C.,” with suggested dates for an Early phase of 3750–3500 B.C. for a Middle phase of 3500–3300 B.C., and for a Late phase of 3300–3150 B.C. (Johnson 1976, p. 205).

Unfortunately, these provisional dates from Khuzestan cannot simply be extended to the sequence in southern Mesopotamia with which we are more immediately concerned. Precluding direct comparison, in the first place, is the fact there has been only one radiocarbon determina-

tion from relevant levels of a site in the Mesopotamian heartland. Based on wood associated with Temple C from level IVa of the Eanna precinct at Uruk, this Late Uruk sample probably should now be calibrated (as were the Khuzestan dates) to read  $3610 \pm 95$  B.C.<sup>2</sup> Although the significance of a single determination must always be heavily discounted, it at least introduces the possibility that developments in southern Mesopotamia slightly preceded their typological equivalents in southwestern Iran. The temporal difference, if indeed there was any, was probably quite small, since the ceramic corpus in the two areas is overwhelmingly similar. But the possibility does receive some reinforcement from the absence of Iranian parallels for Early Uruk pointed-base bottles and painted wares (see Appendix A to this chapter), suggesting that some Uruk ceramic styles could have dropped out of use in the Tigris-Euphrates floodplain before a cognate tradition had reached its full expression in the plains adjoining the Karun, Dez, and Kharkheh rivers farther east. Susa A, it is also worth noting, has generally been regarded as a slightly later cognate of Late Ubaid rather than as a full equivalent (Le Breton 1957, pp. 91, 94).

In antecedent periods, to be sure, the locus of primary achievement may have been the opposite. There is little reason to doubt that at least the sedentary part of the population was larger and denser in parts of Khuzestan during much of the Susiana sequence than it was anywhere in southern Mesopotamia during roughly the same interval. That only dramatizes the rapidity of the processes of immigration or sedentarization or both that occurred in the latter at the very outset of the Uruk period, the population there now rapidly outdistancing that of Khuzestan and forging ahead in the construction of urban centers also. But the more important point, in the present context of a discussion of relative dating, is that Mesopotamia and Khuzestan clearly diverge in a number of respects in spite of their proximity. It would be unreasonable, with substantial differences in the scale and content of the processes involved in the two regions in spite of their considerable stylistic homogeneity in other respects, to assume that developments within them were exactly contemporaneous. All that can be said at this juncture is that the Uruk period in both probably occupied all or some large part of the first three-quarters of the fourth millennium.

The report of survey in the Ur-Eridu region of southernmost Sumer in Henry Wright's appendix indicates a substantial diminution in at least the numbers of individual settlements after the Ubaid period. In all of the region between the lower Tigris and Euphrates, however, an area many times larger, there was a much more striking increase in population between the Ubaid and Uruk periods. This can be observed in figure 9 by comparing the very numerous sites having an Uruk occupation, symbolized

by the adjoining number 2, with the quite rare sites for which an earlier occupation is indicated by the number 1. As already adumbrated in the preceding section, however, this map combines data obtained under very different research conditions and procedures and hence remains very generalized. No attempt is made to differentiate phases of the Uruk period, for example, since that practice could not be extended consistently into the entire northwestern quadrant that was surveyed earlier. Similarly, the lesser density of Uruk sites in the northwest surely must be regarded as an artifact of different methods and topographic conditions to a far greater extent than as a *prima facie* regional difference requiring explanation. One could make a plausible case for an attenuation of early settlement toward the upper, northwest end of the alluvium, linked to greater technical difficulties in introducing simple irrigation systems along more dangerous channels and more pronounced levee backslopes there. But there is little point in doing so when the phenomenon itself is so uncertainly perceived because of the contrastive qualities of the data.

The limited number of Uruk sites known from the northwestern portion of the plain places another constraint on interpretation. One can see in figure 9 that dense clusterings of Uruk sites, probably recoverable only under the conditions of long abandonment and less heavy alluviation obtaining primarily in the southern alluvium, permit us to reconstruct at least portions of the fourth millennium system of watercourses with considerable confidence. Portions of that system, moreover, can be directly traced on the ground and in aerial photographs as a result of wind erosion. Nothing approaching this is generally possible farther to the northwest, where, in consequence, I have made no attempt to posit even rudimentary features of the watercourse system.

There is a tantalizing but poorly understood exception, immediately northwest of the important Ubaid-Uruk town of 'Uqair. The map shows in outline traces of an ancient river meander in this region, taken from an air photograph that I have had an opportunity to examine only briefly (Adams 1972, p. 197). Considered in isolation, there is nothing to connect this feature with 'Uqair or to suggest the period to which it is to be assigned. The possibility cannot be ignored, however, of a connection with the more extensive but otherwise very similar traces of ancient meanders that begin again 75 kilometers southeast and continue in the same southeasterly direction. As I have already indicated in chapters 1 and 2, these latter traces are attributable to a fourth millennium stream, combining some Euphrates water with some Tigris water, and it is highly probable that all the traces not only are coeval but reflect the actions of the same system of watercourses. Absence of similar traces in the intervening area probably is due to a band of heavy sediments laid down by several gigantic canal systems that are known to have

taken a perpendicular course through this area in Sasanian and Islamic times.

Although present evidence does not allow the continuity of the traces as parts of a single system to be conclusively demonstrated, their interconnection is made more plausible by more or less simultaneous shifts in the two regions that may be linked to this river's decline and disappearance. 'Uqair itself underwent a substantial decline in population soon after Ubaid times, and survey of its immediate region suggested that "a serious decline in occupation had commenced all along the northernmost of the Euphrates (now to be understood as Tigris-Euphrates) branches by no later than the Jemdet Nasr period" (Adams 1972, p. 185). Reexamination of photographs of the original Akkad survey collections allows two overlapping but partly sequent aspects of this process to be distinguished. The first affected the northernmost line or group of sites, the one closest to the present position of the Tigris. There Early-Middle Uruk occupations are more or less firmly attested at eight sites (Adams 1972, sites 61, 93, 119, 120, 166, 207, 211, and 215), and isolated finds of clay sickles at a number of other sites along roughly the same alignment may indicate additional, smaller settlements of the same date. Only one of these apparently continues through the late Uruk period (207), and there are also early Dynastic I occupations on this site and one other (93). A very substantial abandonment of the alignment after the Early Uruk period thus is indicated.

The second aspect affected the branch serving the two best-known early sites in the region, 'Uqair and Jemdet Nasr. In this case we can distinguish nineteen Early-Middle Uruk sites (70, 71, 74, 92, 101, 110, 115, 149 ['Uqair], 151, 201, 202, 203 [Jemdet Nasr], 204, 213, 216, 217, 219, 220, and from Gibson 1972, site 98). In addition to 'Uqair and Jemdet Nasr, which lasted well into the Early Dynastic period, three of these sites were certainly occupied in Late Uruk times (201, 213, and Gibson site 98); it is unclear whether Early Dynastic I sherds at seven others (70, 71, 74, 101, 110, 217, and 220) also reflect continuing occupations or only later reoccupations. To summarize briefly this admittedly quite fragmentary data, the information strongly suggests a process of progressive abandonment that was most extensive and probably began earliest along the northernmost of a series of roughly parallel channels. Shortly afterward, it also affected at least one neighboring channel to the south. Conceding the doubtfulness of any interpretation from such data, it is striking to find that the same reconstruction applies to much better documented changes within the boundaries of the present study.

The upper part of figure 11 reproduces all traces of the abandoned channel north and east of Nippur that could be identified on the available coverage in air photographs. It also illustrates all known sites of Uruk date in conven-

## Urban Origins

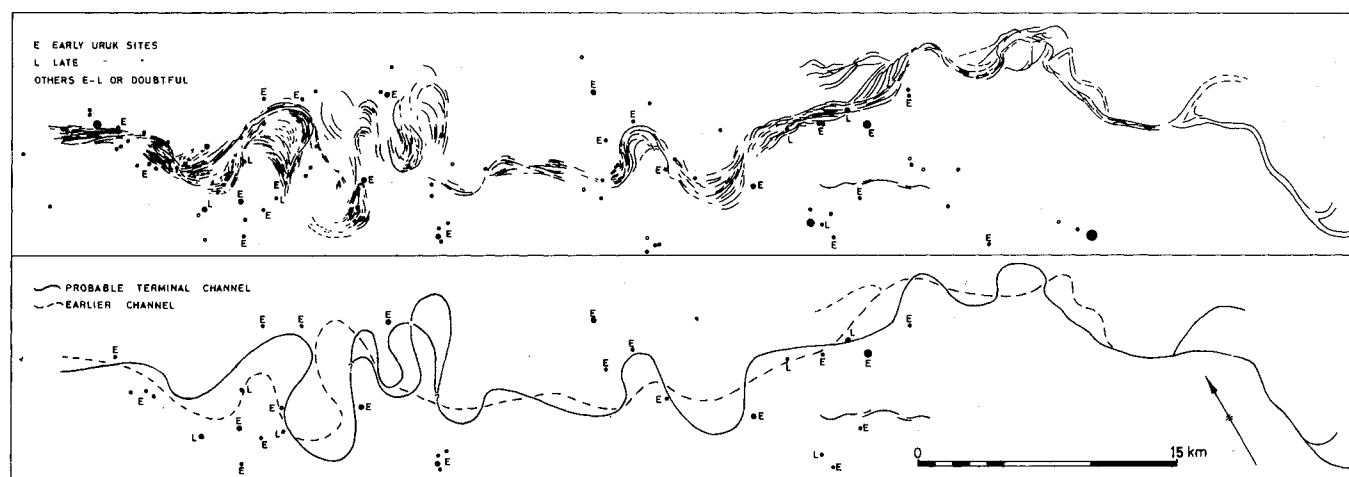


Fig. 11. Fourth millennium channel succession north and east of Nippur.

tional circular form, shown only in outline when there is no more than a trace of an Uruk occupation on a site primarily occupied during another period. Sites are classified by area into one of five classes: 0.1–4.0, 4.1–10.0, 10.1–20.0, 20.1–40.0, and more than 40 hectares. “E” and “L” designations have been added for those sites that clearly can be assigned primarily to either the Early (–Middle) or Late phases of the period, rather than being occupied during both or otherwise being difficult to date unequivocally.

The archaeological and geomorphological information brought together in the upper part of the figure is analyzed in the lower part. Two apparently sequent watercourse patterns are distinguished in the unretouched tracing made from aerial photographs before the possibility of such a sequence was recognized. As an aid to chronological placement of the sequence, only those sites have been transferred from the upper to the lower part of the figure for which an “Early” or a “Late” designation is possible.

It appears fairly certain from this reconstruction that the channel shifted over time from merely sinuous to pronouncedly meandering. The index of sinuosity (channel length/linear length) increases very significantly, from 1.36 to 1.77. According to Karl Butzer (pers. comm.), this suggests a pattern of maturing meanders after an initial stage of more linear channel formation. As I noted in chapter 1, the reduction of gradient associated with this process under certain conditions may be associated with increased stream flow. No such implication applies in this case, however, since the decrease in meander wavelength is normally associated with a reduction rather than an increase in discharge. A directional, internally consistent sequence of meander growth thus is indicated, without necessary implications of channel capture, climatic change, or other upstream factors affecting discharge. Subsequently it appears that flow stopped fairly abruptly.

The looser spacing and reduced amplitude of meanders

in the lower reaches of the channel, in both the earlier and the later phases, argues strongly against an explanation for the increasing sinuosity in terms of base level changes (e.g., rising or falling sea levels, on the assumption that the shoreline of the Gulf was then closely adjacent). Even if one assumes that the head of the Gulf in the fourth millennium lay not far east of the terminus of the channel that is shown and that sea level there changed substantially during the interval when the channel was in use, it is difficult to see how this could affect meander patterns in the upper reaches without visibly altering the lower channel. Hence the sequence of patterns that is shown must be attributed to the interplay of other factors, such as the aforementioned evolution of a more linear pattern toward maturity or changes in the hydrological regime or sediment load.

While in some respects less decisive than might be hoped for, the archaeological evidence contributes substantially to dating this sequence. In the first place, the placement of many sites, particularly those of the late Uruk period, immediately alongside and even directly over channel deposits makes it clear that the channel shown here was not in use at any time subsequent to the Uruk period. That conclusion also follows, of course, from much more extensive evidence of overlying canal and settlement systems. Additionally, it appears that the second, mature-meander phase of development was the one that coincided with—or possibly even led to?—the rapid colonization of the surrounding plain during the Early (–Middle) Uruk period. If so, the sinuous-channel phase then must be of Ubaid date. Nothing in the available record suggests that it was necessarily of long duration, which may help to explain why there is so little evidence of an Ubaid occupation in this vicinity. Finally, to return once more to the placement of the Late Uruk sites, they may afford an indication of a changing regime. Tending



to hug the terminal channel more closely than the Early ones, some of them were in fact situated on bank deposits that had been newly laid down as the channel moved from its sinuous phase to its mature-meander phase. This may argue that discharge during their period of settlement was less subject to sharp, dangerous peaks, a general characteristic of meandering as distinguished from sinuous streams. It does not suggest, however, that siltation processes were leading to a gradual reduction of flow. If that were the case, the powerfully developed later meanders would occupy a progressively narrower rather than wider belt. Hence the cessation of flow again appears likely to have been fairly abrupt and unanticipated, probably stemming from a breakout of the course into a new bed that originated much farther upstream.

Hypothetical though it is, this reconstruction suggests that natural forces contributed importantly to the dynamics of Uruk settlement. An extensive abandonment of the northern part of the region after the Early (-Middle) Uruk period can be shown, and the cessation of flow of an important watercourse seems very likely to have been at least one precipitating agency. The attenuation of settlement adjoining the branch that is illustrated in figure 11 is subject to misinterpretation, however, if it is viewed too narrowly. A comparison of changes in settlement from Early to Late Uruk throughout the northern part of the region (figs. 12 and 13), extending to a much wider belt, most of which must have been watered by other branches, makes clear that only scattered outlying settlements and a few major towns escaped the general decline. This may be interpreted as indicating that a number of watercourses failed simultaneously. On the other hand, the only course that does not reemerge as an important artery of settlement in the later historical record is the one whose relatively brief hydrographic development can be more satisfactorily traced. In all probability the completeness of the pattern shown in figure 11 is a direct consequence of the absence of later use of this course, preserving its traces without overburden or alteration. But the question that then must be left open is whether it depicts a more general crisis, possibly involving some at least temporary disruption of the multiple sources of water on which the whole region depended, or only a more localized failure. It is even conceivable that changing relationships within a still broader geographical framework played a part in the abandonment of this region. Johnson has provided evidence, also from surface reconnaissance, of a "major population decline" after the Middle Uruk phase on the upper Khuzestan plains of southwestern Iran. By the equivalence of site area with resident population employed here, this would have involved some eight thousand persons. Failure or movement of river branches cannot have been a significant factor in the apparently quite rapid displacement of the human population from this ecologically quite different setting 300 kilometers east. In the absence

of convincing evidence for other environmental factors, Johnson's suggestion that the decrease may have been related in some way to "political instability and eventual hostilities" is certainly plausible (Johnson 1973, pp. 154-55). What is implied, of course, is breakdown of settlement and out-migration from the region. Wholesale extermination is essentially unknown under conditions of primitive warfare.

Political instability is at least as likely to have been a significant source of the breakdown in this case, considering the greater size and number of potentially competitive centers and the greater obstacles to stability as well as to integration presented by a much larger region. But assuming that growing politicomilitary rivalries in each area may have been at least a contributing factor, we must then ask whether these were wholly separate, parallel processes or whether instead they were to some extent linked. The question remains speculative in the absence of useful archaeological leads, but nothing of what is known about the advanced state of urban development in either region seems to preclude occasional forays at a radius of military action greater than 300 kilometers. Included in the repertory of motifs of the glyptic art of the Late Uruk phase are representations of armed figures, processions of bound prisoners, and apparent casualties. And the sign later identified with women of dependent status, including slaves and hence possibly indirectly reflective of hostilities, occurs on some of the earliest pictographic tablets from Uruk at approximately the same time (Johnson 1973, p. 152; Falkenstein 1936, p. 57).

The general decline of population in the north that had set in by Late Uruk times in some ways accentuated a feature of settlement there that was already evident earlier. Communities of markedly different size appear to have gravitated to different zones or even river branches from the very beginning of the Uruk period. In the north central part of the northern region there are clusters of small hamlets, villages, and towns. Evenly dispersed to the south of these are the much larger centers, while beyond them lay a very large region, much of which was devoid of permanent settlement of any size.

It would be interesting to know more about the special characteristics of these larger centers, but this is a possibility in the near future only as an outcome of current British excavations at Tell Abu Salabikh. At Nippur the pertinent levels are so deeply buried beneath later levels of debris that a reliable estimate even of the order of magnitude of size of the site in Uruk times is very difficult. At Adab, unexcavated since early in this century and now submerged beneath drifting sand that makes adequate surface collection difficult, we cannot yet document any occupation before the Early Dynastic period even if one seems inherently very likely. If the hollow outline indicating Adab in figures 12 and 13, east-southeast of site

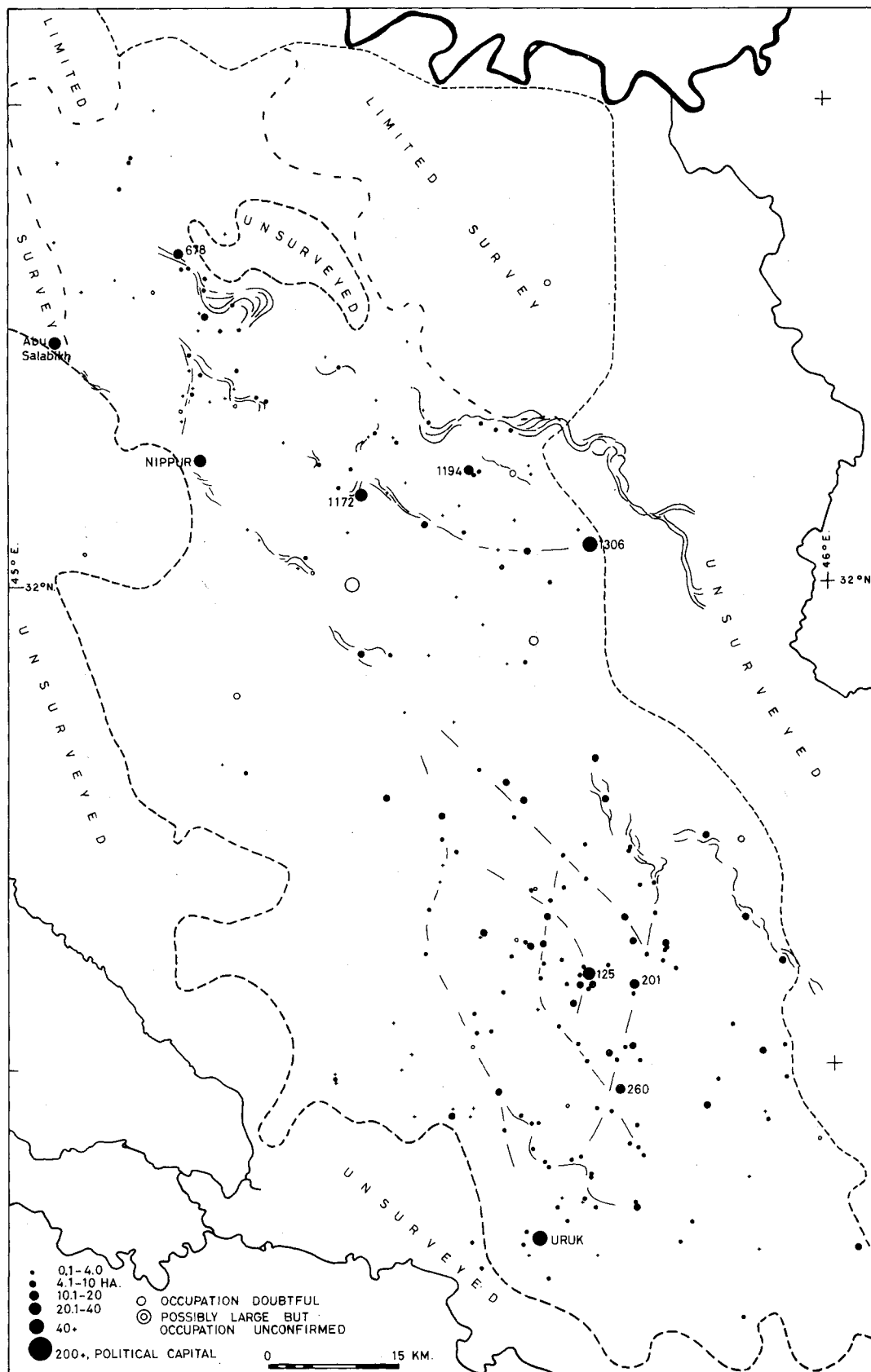


Fig. 12. Early-Middle Uruk period settlement patterns.

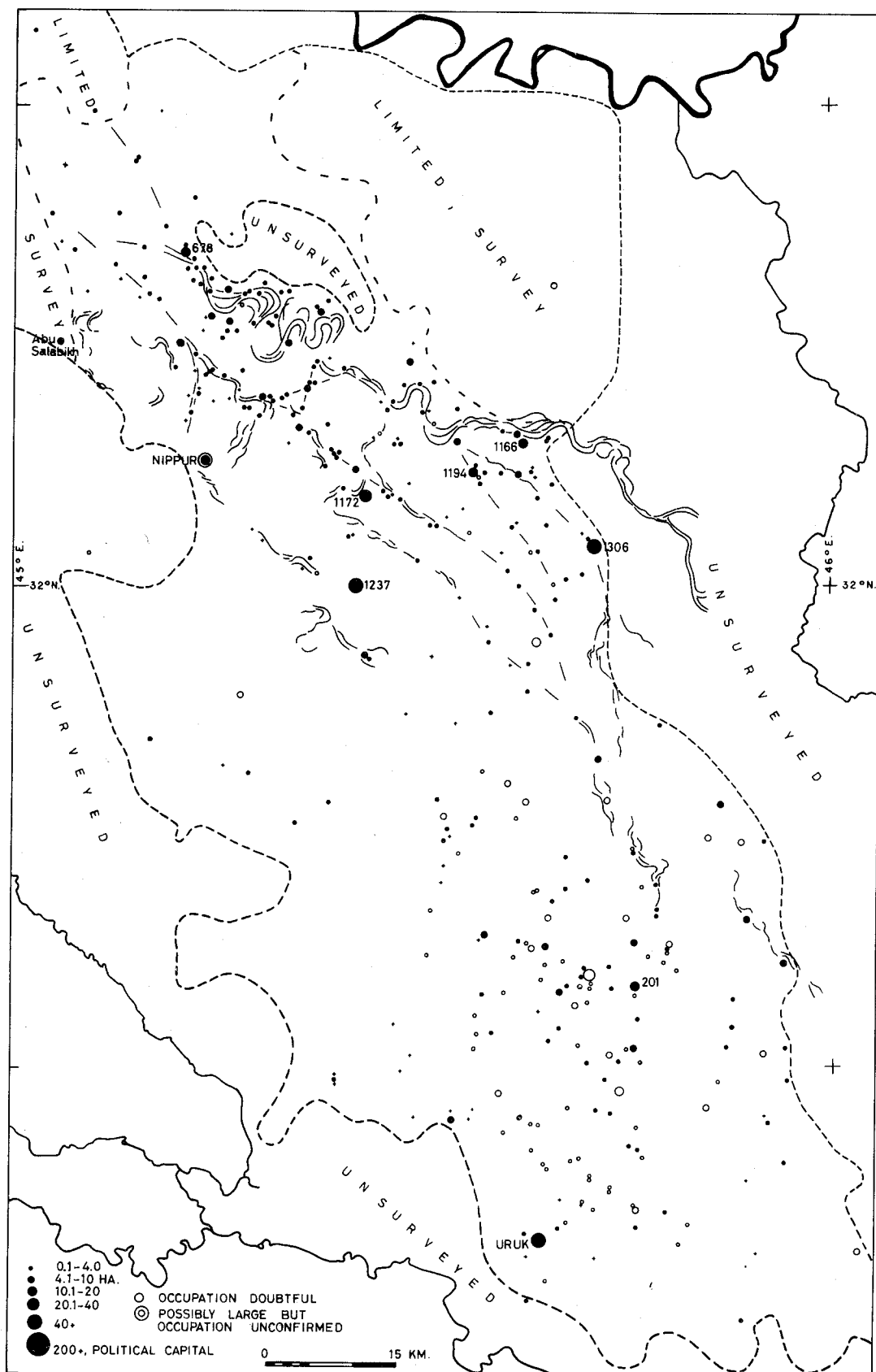


Fig. 13. Late Uruk period settlement patterns.

1237 and south-southwest of site 1306, were filled in by new discoveries, the impression of a remarkable uniformity of spacing among these larger Uruk centers in the north would be considerably reinforced. Prospective excavators concerned with this problem are also urged to give thought to Tell al-Hayyad, site 1306, perhaps the largest, best preserved, most accessible site anywhere whose climax of occupation occurred during the Uruk period.<sup>3</sup>

What is one to make of this striking zonation of settlement? Perhaps we can partly explain the paucity of small villages along the great arc between Abu Salabikh and Tell al-Hayyad by assuming that large adjacent areas were claimed by the inhabitants of the major towns for their own intensive cultivation. But that does not seem entirely adequate; the areas left empty are many times larger than could possibly have been cultivated by any reasonable projection of the population of the major centers. Nor does that explanation assist us in understanding the absence of a symmetrically placed band of smaller settlements flanking the major centers on their other, southern side.

As another part of the explanation, therefore, we must assume that conditions did not permit a zone of agricultural villages south of Abu Salabikh and Nippur. That does not necessarily mean a complete absence of water in the area, but only an absence of reasonably stable channels whose hydrographic regimes and accompanying levees encouraged small-scale irrigation. It would be difficult to imagine a set of conditions in the area before any substantial human impact, in fact, that could have diverted the flow of the Euphrates entirely away from a central segment of its alluvial plain. Instead we can best visualize the area as one of seasonal swamps interspersed with steppe, of insequent, ephemeral channels, and of exposure to widespread, periodic flooding. The better-established river channels to the north, and the favorably situated backslopes of their adjacent levees, would have been much more conducive to permanent settlement. But this area nonetheless could have represented an important resource as a natural habitat for wild animals and above all as pasturage for flocks.

There was, then, a line of major towns along the interface between a region of dense cultivation and a region not so employed but instead useful only for pastoral and other nonsedentary activities. Those towns cannot be regarded merely as independent *organisms*, explainable on the basis of subsistence resources drawn from their own hinterlands, for they were also specialized *organs* within a larger system of relationships. Specifically, they must have served to regulate and facilitate reciprocal exchanges of the resources in which the two adjoining regions specialized. Within the institutional frame of early Sumerian civilization, this did not presuppose the existence of centralized marketplaces. This, it seems, is the context within

which to understand the—admittedly, much later—mashdaria texts in the Bau Temple archive in late Early Dynastic Girsu. Included among the household consumption goods mainly dealt with by these texts, in addition to the young kids from which the term itself is derived (and from which in turn may be derived the later term for interest on loans), are lambs, fish, bread, butter, oil, cheese, dates and other fruits, onions, garlic, beer, wine, and so forth. Originally interpreted simply as offerings to the temple within the rigid framework of an all-embracing *Tempelwirtschaft* (Deimel 1927; 1931, pp. 100–101), they are perhaps better described in more general terms as ritual gifts and interchanges between groups of specialized, primary producers and officials with a variety of secular as well as religious functions. Other economic facilities and administrative agencies were probably also geographically diffuse and multifunctional rather than localized and narrowly specialized. Moreover, it cannot be forgotten that towns like these were cult centers, as Jacobsen has pointed out in connection with his identification of the Sumerian “high edin” of the third millennium as steppeland devoted to pasturage (1954, p. 54). Reaching out in imagery to herdsmen and fishermen as well as cultivators, they encouraged as well as benefited from the intercourse among strangers that could be carried forward more peacefully and dependably within the sanctity of a god’s domain.

Turning from the major centers of the northern region to the smaller, more densely clustered settlements north of them, it is surely reasonable to regard both the latter and the districts in which they occur as more uniformly devoted to primary agricultural activities. For the provision of at least certain goods and services, therefore, the inhabitants of these districts must have been dependent on specialists in the major centers. The forms and extent of exchange or redistribution need not concern us here, although subsequently I will direct some discussion to these questions. But the existence of a gradient of specialization in any case suggests a southward movement into the larger centers of comestibles that would have contributed to the support of various craft, religious, administrative, and perhaps military specialists who resided there. The return flow is less simply described. Included in it must have been certain near-necessities imported from regions far distant from the Mesopotamian alluvium, such as flint, obsidian, copper, stone, and wood (other than the soft, fast-growing poplar that was available locally) for tools. But also perhaps to be counted are urban contributions like military protection, larger stores of reserves in the event of famine, and the promise of sympathetic intervention by a deity thought to be housed in the city temple—all exasperatingly intangible from the viewpoint of archaeological surface reconnaissance. Further complicating any attempt to conceptualize the pattern in terms of reciprocal flows is our uncertainty over the essential

character of the relations between the larger centers and the agricultural districts farther north. Insofar as the pattern was already one of the firm, continued subordination of the latter, whether in the fashion of later city-states and their dependencies or merely in a loose but effective tributary arrangement, there is no reason to think of an evenly balanced exchange of even symbolic goods for the southward flow of subsistence products.

This reconstruction is somewhat overgeneralized in that it fails to take into account the differentiation of settlement size within the zone of clustered, smaller settlements. A glance at figure 12 will indicate that numerous towns, some of them of considerable size, occurred there in addition to still more numerous villages. Note, however, that virtually all those towns are closer to one another than they are to any of the centers farther south. While there is considerable doubt about the size of some of the latter during the Early-Middle Uruk period, for reasons already indicated, certainly some of them (1172, 1237, 1306), and in all likelihood Nippur and quite possibly Abu Salabikh as well, were substantially larger than their northern contemporaries (678, 1166, and 1194, as well as numerous others in the range of 4 to 10 hectares). Hodder and Orton have described this kind of distribution as a modification of the classic central place model that often provides a somewhat closer fit to the available empirical evidence. Citing a variety of archaeological as well as contemporary examples, they suggest that it is the aggregation of services (for our purposes construing services very broadly) in centers of higher order that extends the range of their influence (1976, pp. 63–64). In other words, while specialists who also performed some of those services were to be found in the districts of generally small, clustered settlement, larger and more diverse groupings of specialists in major centers like Nippur and site 1306 reinforced their individual scales of operations and were able to attain a disproportionately wider radius of influence.

The density of settlement in the northern region, fortunately, is great enough to permit at least the approximate lines followed by the major Early-Middle Uruk watercourses to be recognized with little ambiguity. Assisting in their identification, of course, are not only the surviving traces that have been exposed by wind erosion but also the known positions of the major, long-lived channels that are even better attested for following periods. It is these watercourses that constituted the main axial lines to which the settlement pattern as a whole was oriented. No conceptualization of the pattern can ignore the major channels and their accompanying levees as the overwhelmingly most favorable loci for the siting of towns, for routes of intercommunication, and for the most productive and intensive irrigation agriculture. The region is to be thought of, in short, not as the featureless peneplain of uniform hexagonal service areas envisioned by central

place theorists (Haggett 1966, pp. 119–25) but as a web of enclosed cells and elongated strips alternately more or less favorable for intensive land use, sedentary life, and the rapid, efficient interchange of persons, goods, services, and information.

This view finds schematic expression in figure 14. Here unit distances between neighboring settlements along straight but evidently branching and rejoining watercourses are arbitrarily assumed, permitting a simplified and hence clearer representation of the distribution of settlements of different sizes along the network of watercourses. Particularly evident is the contrast between widely spaced towns in the lower part of the diagram, interspersed with very few other settlements, and the almost continuous strings of generally smaller settlements along other branches farther north.

Several other important aspects of the pattern are highlighted by this diagram. In the first place, the significant clusterings of settlement along opposite banks of the larger branches exhibit a partially alternating distribution or at least do not regularly occur together. The group of sites including 1159, 1165, 1166, 1194, 1205, and 1306, for example, has no counterpart to the north of the river along whose right bank (and right-bank branches) it is situated. Similarly, the right bank grouping below site 765 is succeeded by a predominantly left-bank grouping in the vicinity of sites 976 and 1020. A right-bank/left-bank alternation is particularly clear for sites larger than 4 hectares, suggesting that towns above this minimum size tended to be fairly evenly dispersed rather than clustered. The same tendency toward a dispersed distribution of the larger components of the settlement pattern is apparent if we consider the succession of settlements along either bank of any of the watercourses. Sites of 4 hectares or less occur in uninterrupted groups of up to ten, with the interesting further property that those of 1 hectare or less are most often found either completely isolated or along the margins of a larger enclave. Sites of more than 4 hectares, on the other hand, rarely or never adjoin one another.<sup>4</sup> Finally, sites of more than 10 hectares curiously resemble the very smallest ones in some of their relationships. For example, they occur most often either quite isolated or else adjoined by very small sites rather than other large ones. Surely, however, different explanations account for the resemblance in overall distribution. The smallest hamlets were probably attenuated forms of settlement normally associated with marginal conditions and hence with the peripheries of settlement. Large towns, on the other hand, must have been located in the center of cultivated regions. Their isolation reflects their success in excluding competing settlements from terrain utilized (or potentially utilizable) by the towns' own inhabitants.

Turning once again to figure 12, the asymmetry of the distribution in the northern region deserves some attention. Insofar as a dependent relationship is posited be-

## Urban Origins

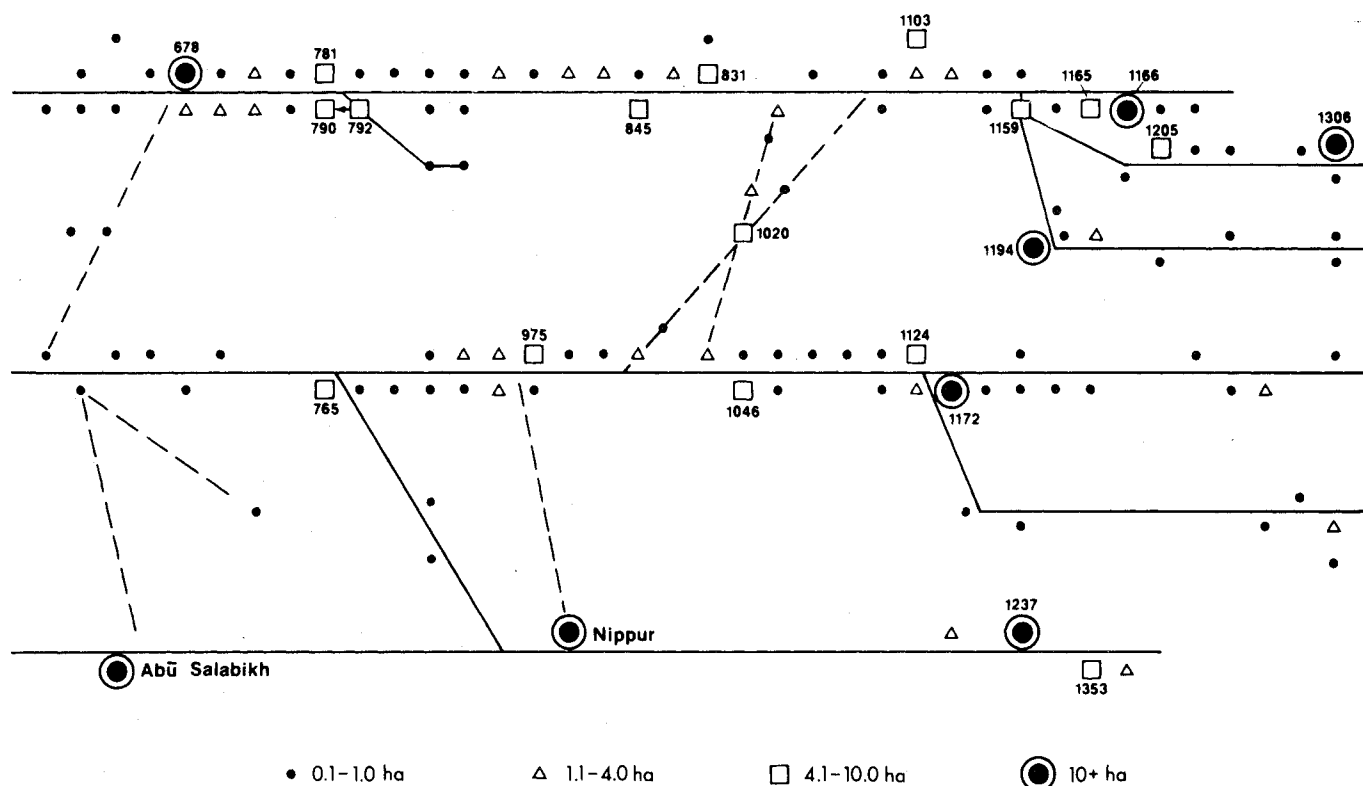


Fig. 14. Schematic representation of arteries of supply and settlement distributions in the Nippur-Adab region during the Early-Middle Uruk period.

tween the dense zone of agricultural settlement and the line of large, evenly dispersed centers slightly farther south, one might imagine that a similar line could have existed to the north of the dense zone. Yet this does not occur. Perhaps a long-term division in control over a subordinate, primarily agricultural region would have been too destructive. Somewhat more surprising is the abrupt breakoff in small settlement as well. In fact, a large district that seems to have been entirely devoid of permanent settlement of any kind extended all the way northward to at least the present position of the Tigris.

One might assume that much has been irretrievably buried beneath a heavy blanket of sediments laid down by the Tigris, save that this would hardly explain the absence of even the ubiquitous "stray" clay sickles of Uruk manufacture on the many great mounds in the region that are of much later date. Perhaps the most reasonable explanation of this disparity is the size and destructiveness of the Tigris itself, as described in chapter 1. The risk was in general too great for substantial towns to be sited within reach of major Tigris floods. The interface with the pasturelands to the south, on the other hand, provided a series of relatively favorable and protected locations. In any case, we cannot even say at present what course was followed by the major part of the Tigris flow. Some, it has

been argued, must have been included in the meandering channel serving the dense band of small agricultural settlements in the northern part of the Nippur region. Other branches may have occurred at any point within the 40-kilometer band separating the northern limits of settlement found in this study and the southern limits of contemporary settlement on the plains adjoining the lower Diyala (fig. 10). Because of the dangerous and unpredictable character of the Tigris, it seems likely that the use of this band by pastoralists would have been more sporadic and less intensive than in the otherwise ecologically comparable zone south of Nippur.

The foregoing reference to "stray" clay sickles prompts a fuller discussion of the interpretive problem they represent. All sites where other contemporary prehistoric remains were absent and where only one or two of these fragments were noted are shown in figures 12 and 13 with crosses rather than with dots like other sites. Since clay sickles were in common use during the Late Ubaid period as well as in Uruk (and to a rapidly declining extent, also later) times, the chronological position of these isolated occurrences cannot be exactly assigned. It is also not possible to determine whether they are vestiges of real but small settlements that happen to have been heavily masked by overburdens of later debris, or whether instead they

were merely discarded after breakage in outlying fields and subsequently became incorporated in the occupational remains of much later periods.

Henry Wright takes the position, in his appendix to this volume, that clay sickles were most common during the Late Ubaid period. The strays he records were in many instances far from the sharply reduced number of sites that he can assign to the Uruk period on more secure grounds. Hence he suggests that in the Ur-Eridu region they are to be considered as discards of Ubaid date within belts of cultivation adjoining natural watercourses or canals. Farther to the north, however, a different explanation seems more compelling. Except for the southernmost portion of the central floodplain (closest to Ur and Eridu), as already noted, sites that could be assigned to the Ubaid period on less equivocal grounds than the presence of clay sickles was very rare. Uruk sites were exceedingly common, on the other hand, and those of the earlier part of the period sometimes outnumbered all other identifiable ceramic types. And while in some instances the crosses in figures 12 and 13 occur in marginal locations consistent with defining an outlying belt of cultivation, the vast majority of them are closely interspersed among other Uruk sites and, like the latter, remain in the proximity of ancient watercourses that are often directly traceable on the air photographs. This suggests that "stray" clay sickles—on the central floodplain, although not necessarily along the southern margins of Sumer—probably reflect small Uruk settlements rather than Ubaid cultivation. Both explanations are inherently likely to have some applicability, if to markedly differing degrees, in the different parts of what is after all a single alluvial plain without great intervening distances or other geographic barriers. But no further resolution of this issue seems possible, at least for the present.<sup>5</sup>

Patterns and trends of Uruk settlement have heretofore been characterized in qualitative and perhaps somewhat impressionistic terms, although the characterizations are drawn from maps that systematically reflect the survey's findings. A more detailed quantitative assessment offers some opportunities for further insight into ongoing processes of change. This is possible, of course, only within the intensively surveyed area. Table 3 contrasts trends with respect to the extent of settlement from Early to Late Uruk, separating the northern and southern parts of the surveyed area. A glance at the maps illustrating the succession of settlement patterns over this interval makes it clear that these two parts formed cohesive, internally homogeneous units that were strikingly dissimilar in their histories. Hence an analysis of trends requires that they be kept distinct rather than conflated.

One observation is in a sense antecedent to this table and introduces a more general characteristic of the Uruk period. Some 360 hectares of settlement are recorded in the northern part as early as the Early-Middle Uruk phase.

TABLE 3 Gross Regional Trends in Uruk Period Settlement

	Uruk Enviorns	Nippur- Adab Enviorns (North of WS-004)
<i>Early-Middle Uruk period</i>		
Total recorded settlement	173.1 ha	362.0 ha
Percentage of total in sites of 5 hectares or less	24.7	35.0
<i>Late Uruk period</i>		
Total recorded settlement	382.5 ha	200.6 ha
Percentage of total in sites of 5 hectares or less	34.8	24.6

*Note:* The intent of the above tabulation, as well as of figures 14 and 15, is to contrast trends from Early to Late Uruk in two regions. In keeping with that objective, sites are not included in which criteria of the Early-Middle and/or Late Uruk periods were not specifically identified and differentiated. Thus, sites listed in Appendix A to chapter 3 with the designation "2/3/4" are not included in the above totals. Sites with the designation "(2 3 4)" also are not included. These two categories together comprise approximately 39.4 hectares of additional Uruk settlement. There are thirty-two such sites, most of them obviously very small.

A reasonable and perhaps conservative estimate of the population involved, based on the standard of 125 persons per hectare of actual site area, or about 100 persons per hectare as calculated only from measurement of maximum length and width,<sup>6</sup> is 36,000 persons. Yet this area was almost devoid of permanent settlement in the Late Ubaid period. Nippur and Tell Abu Salabikh can be presumed to have had no more than at most a very few thousand inhabitants. Ubaid traces at other sites are essentially negligible. In other words, this was an extraordinarily rapid, massive process of growth at the very outset of the Uruk period.

Population increases under modern conditions can dwarf those of any earlier period. Annual increases of 3 percent (or even slightly higher) have occurred for some decades in a number of countries, spurred by the rapid, worldwide movement of foodstocks and by the general implementation of public health programs. The doubling time in these circumstances is only twenty-three years. A tenfold increase would occur, if all other conditions remained the same, in seventy-seven years. Such rates, however, are absolutely unprecedented. Occasionally in earlier times there may have been a doubling of population over as short an interval as one generation, but surges of that kind were surely of very limited duration (Dumond 1975, p. 714). Yet something closer to a tenfold increase than to

a doubling seems to have occurred on the central Euphrates floodplain, and within a period not exceeding one or two centuries. Favorable natural conditions, to be sure, must have encouraged vigorous natural growth. But in addition it is virtually certain that we are witnessing either an extensive pattern of immigration into the region, this rapid conversion of large numbers of formerly semisedentary folk into settled agriculturalists, or, more likely, both together.

Greatly complicating the question of immigration is the scale of the phenomenon. Comparing figure 12 with figure 9 not only discloses the increased proportion of recovery in the uncultivated regions surveyed more recently but strongly implies an extension of the dense Early-Middle Uruk clusterings of settlement far to the northwest of where they are currently known. If so, the estimate of some thirty thousand apparent immigrants within a very short period can be no more than a fraction of the population entering the Mesopotamian alluvium within the space of only a few generations. Moreover, the same trend has been described farther afield. Johnson (1973, p. 90) reports more than a trebling of the area of settlement (admittedly, after an earlier decline) and assumes as I do that this very likely represents an approximate trebling of the sedentary population also, on the Khuzestan plains around ancient Susa during the Early Uruk period. Whence, and in response to what pressures or incentives, could a stream of new settlers of this magnitude have come? Lacking an obvious source, there is some predisposition to emphasize a local process of sedentarization of folk whose presence was not previously ascertainable by archaeological means. But again the apparent rapidity and scale of the process create problems for which no convincing answers are immediately apparent. Quite possibly the answer will be found less in an endless further refinement of archaeological techniques (although the importance, and indeed inevitability, of that can hardly be denied) than in a revision of our constructs. The range and rate of movement of prehistoric peoples, under conditions of low population density and hence limited competition for the use of land, may often have been much greater than seems "natural" on *a priori* grounds.

Turning back once more from speculation to the (relatively) greater certainty of archaeological survey data, table 3 confirms the visual impression from the sequence of Early (-Middle) and Late Uruk maps that the initial focus of settlement was preponderantly in the north. The two parts are roughly equivalent in size, yet two-thirds of the recorded total site area in the earlier part of the period is found in the environs of ancient Nippur and Adab rather than in and around the great southern center of Uruk. It is also noteworthy that a significantly higher proportion of settlement in the north took the form of relatively small towns and villages, occupying an area of less than 5 hectares. That may well be related to the smaller part played

in the newly emergent pattern there by townsmen and settlers already long identified with the region.

In the Late Uruk period the positions neatly reverse themselves. There was only an 8 percent increase in the aggregate of recorded area for the two regions, surely an amount so low that it requires no further resort to an assumption of substantial immigration or sedentarization. But the contribution of the Uruk region more than doubles, while that of the north falls by almost half. Moreover, the higher proportion of smaller settlements also shifts to the south, while that in the north declines to the same level that had been obtained earlier in the south. These figures leave a strong impression that we are dealing with a further population movement, although on a more restricted geographic scale. If we take into account the artificial limitations of the surveyed area from which the only quantitative data are available, literally tens of thousands of small villagers appear to have abandoned their homes and moved southward.

Further detail on regional differences and temporal changes in the hierarchy of settlements is provided by the histograms in figure 15. The tendency for a proportionately greater number of small sites to occur in the north in the early part of the Uruk period and later to shift to the south is once again apparent. But in the more refined breakdown given here that shift may be seen to subsume other changes as well. Sites thought to be exceedingly small, 0.1 hectare or even less, are equal in numbers to all the remainder in the north during the Early (-Middle) Uruk period. Sites with only a "trace" of an Uruk occupation (one or two sherds), not included in this tabulation, might add half as many sites again of the same small size. We do not know, in the absence of excavation, whether they generally consist of isolated rural farmsteads housing at most a family or two, larger villages that left few remains because they were occupied only briefly, or perhaps stations devoted to some specialized activity in the countryside that were not regular habitations at all. But in any case this large category declined abruptly by the Late Uruk period. More than nine-tenths of it disappeared in the north, and though there was some increase in the south it failed to match either the increase in the number of sites or the increase in the total population.

As I have already noted, the left or lower ends of the histograms reinforce the earlier impression of a shift from north to south. The environs of Nippur and Adab in the Early (-Middle) Uruk phase and of Uruk in the Late phase are alike in showing a markedly increasing number of sites as one moves to smaller and smaller size categories. This tendency is also present, but to a significantly lesser degree, in the earlier part of the period around Uruk and in the later part around Nippur and Adab. Insofar as there is a "natural" tendency for the number of settlements to be inversely proportional to size, forces appear to have been at work in the latter cases that had a disproportion-



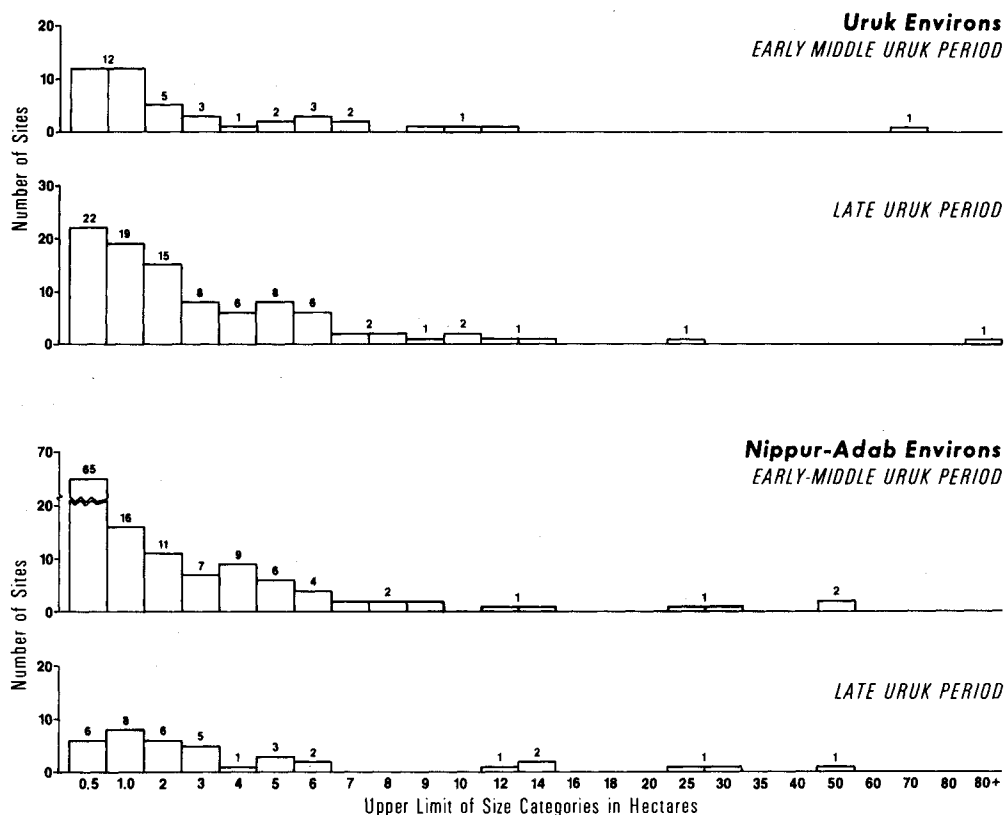


Fig. 15. Distribution of Uruk site areas by regions and subperiod.

ately adverse effect on smaller settlements or perhaps tended to support population concentrations rather than dispersals.

It is difficult to make a case for any particular set of distinct size categories at the lower ends of the histograms. Either aggregating them or examining them individually, there is a more or less regular decline in numbers from the smallest size categories to ones that are considerably larger. To be sure, several of the distributions have a long "tail" extending to the right, to upward of 5 or 6 hectares. Those tails suggest that a discrete grouping probably still awaits unambiguous identification in the realm between 3 and 7 hectares, under the rubric of large villages, small towns, or whatever other term may be appropriate. But let me stress that such a category cannot be clearly differentiated with the data now available. It is analytically convenient to group sites by size, creating a separation

in the neighborhood of 4 or 5 hectares, but it cannot be argued that the separation into two categories mirrors a gap in the actual distribution of site sizes.

This blurring does not occur at the right, or upper, end of the histograms. There are wide gaps in all of them between the solid grouping of smaller sites and a handful that are several to many times larger. In some cases there is a suggestion of a small but distinct grouping in the 10–14-hectare range. The next group, with no intervening examples, occurs between 20 and 30 hectares. Then there is another small group, again without intervening examples, between 40 and 50 hectares. Finally there is Uruk itself, surely the largest single center throughout the period. It is suggested here that Uruk grew from an area of about 70 hectares in Early Uruk times to about 100 hectares by the end of the period.

The size distribution of the clusterings, or the gaps be-

tween them, may be due in part to the random variation expectable with very small numbers. We will see presently, however, that approximately the same clusterings and gaps continue to occur through a long succession of later historical periods. This strongly suggests that by the Uruk period at least the larger centers were already falling into place at certain steps or intervals that were disjunctively separated by distance, specialized function, and range of religious influence or administrative-political control. Granting Uruk's extraordinary importance, an explanation of urban growth in this period that singles it out as the largest center and then deals exclusively with its unique concentration of ritual activities simply will not suffice. Uruk was surely at one of the apexes of a (probably fairly diffuse) politicoreligious system, but the hierarchical ordering characteristic of the system must have been a common feature of many lesser centers. In order to generalize about precisely the systemic aspects of urban and civilizational growth, I shall shortly employ a number of additional approaches to examine further the hierarchical and distributional aspects of settlement.

Figure 16 applies a different and in general somewhat higher level of aggregation to the same data base used for the histograms, the estimated sizes of Uruk sites that are given in Appendix A to this chapter. The purpose in this case is not to display the full array of different site sizes, highlighting gaps and clusterings in the series in order to infer from them the ascending tiers in the settlement hierarchy. Instead, the more aggregated classification makes clearer the nature of regional and temporal similarities and contrasts. Here, for example, the exceptional Early Uruk emphasis given in the northern part of the area to a range of smaller units of settlement is considerably more evident, as well as the subsequent, all but complete disappearance of the smallest units. Here also can be seen the apparently complete dominance that Uruk already exercised over its own hinterlands in Early Uruk times. Later, to be sure, we can see the growth of a few centers of intermediate size around it, which initially were wholly absent. It is tempting to suppose that they were not solely a consequence of population growth but were in some way related to unstable conditions and power displacements resulting from the arrival of large groups of northern immigrants. But in any case it is not so much the absolute numbers of sites in each category that is of interest (shown in solid columns) as it is the shape of the curves connecting them. Save for the aforementioned deflection to the low end of the continuum in the case of the northern part of the region in Early and Middle Uruk times, the general similarity of the curves largely overrides the differences between them.

The outline columns adjoining the solid columns indicating absolute numbers of settlements convey information of a different kind. The smallest sites of 0.1 hectare area or less, whether they were isolated rural farmsteads,

temporary encampments, or whatever, bulk large in the histograms of numbers and have so far played a considerable part in the discussion. But on any reasonable estimate of their population they were essentially insignificant in comparison with the much smaller numbers of towns and large villages. In a word, it was primarily the relative proportions of the total population living in larger and smaller communities that influenced the nature of the society, not the relative numbers of the settlements themselves. Recognizing that there was surely considerable variation caused by other factors, at present we can only proceed on the assumption that site area and population covary in direct proportion (Adams and Nissen 1972, pp. 28-30; cf. Wenke 1975-76, pp. 90-92). The outline columns reflecting proportions of the total settled areas complement the histograms of site sizes, therefore, with an approximate picture of the proportions of the population living in settlements of each category.

The first general observation to be made about these graphs of population distribution is that they contrast sharply with the accompanying graphs of site distributions. Site distributions classified by size all peak unimodally at a relatively small size, with a long "tail" extending to the right into the higher categories. Populations, on the other hand, were in each case bimodally distributed. Perhaps we may speak at least figuratively of a broad contrast between villagers and small townsmen, on the one hand, and urbanites on the other. At any rate, these polar terms suggest the two significant components into which the population was divided throughout the Uruk period.

Second, there is an enduring contrast between the northern and southern parts of the area with regard to the makeup of the "urban" component. In the south it consisted of Uruk alone or virtually alone; the nadir between the two modal maxima lies at 25 hectares or above. Presumably the presence of Uruk in various ways discouraged the growth of potential competitors above this limit. In the north there is a larger group of urban competitors, a number of them more or less equivalent in size, although there is no way of being certain that size is a reliable index to ranking in terms of power or prestige. The nadir between the two modal maxima is deflected leftward in this case, to about 15 hectares in the Early and Middle phases and to less than 10 hectares in the Late phase. At least to judge from the hierarchy of surrounding site sizes, therefore, Uruk dominated if not directly controlled its immediate hinterlands to a far greater degree than did more northerly centers.

This contrast between the north and the south with respect to the dominance of a single center also may be expressed in terms of a scale of urban "primacy." As was initially pointed out many years ago by Zipf (1949), advanced industrial nations tend to be characterized by a "rank-size rule" in which, if the cities of a region or country are arranged in order of size, the largest will be

# Urban Origins

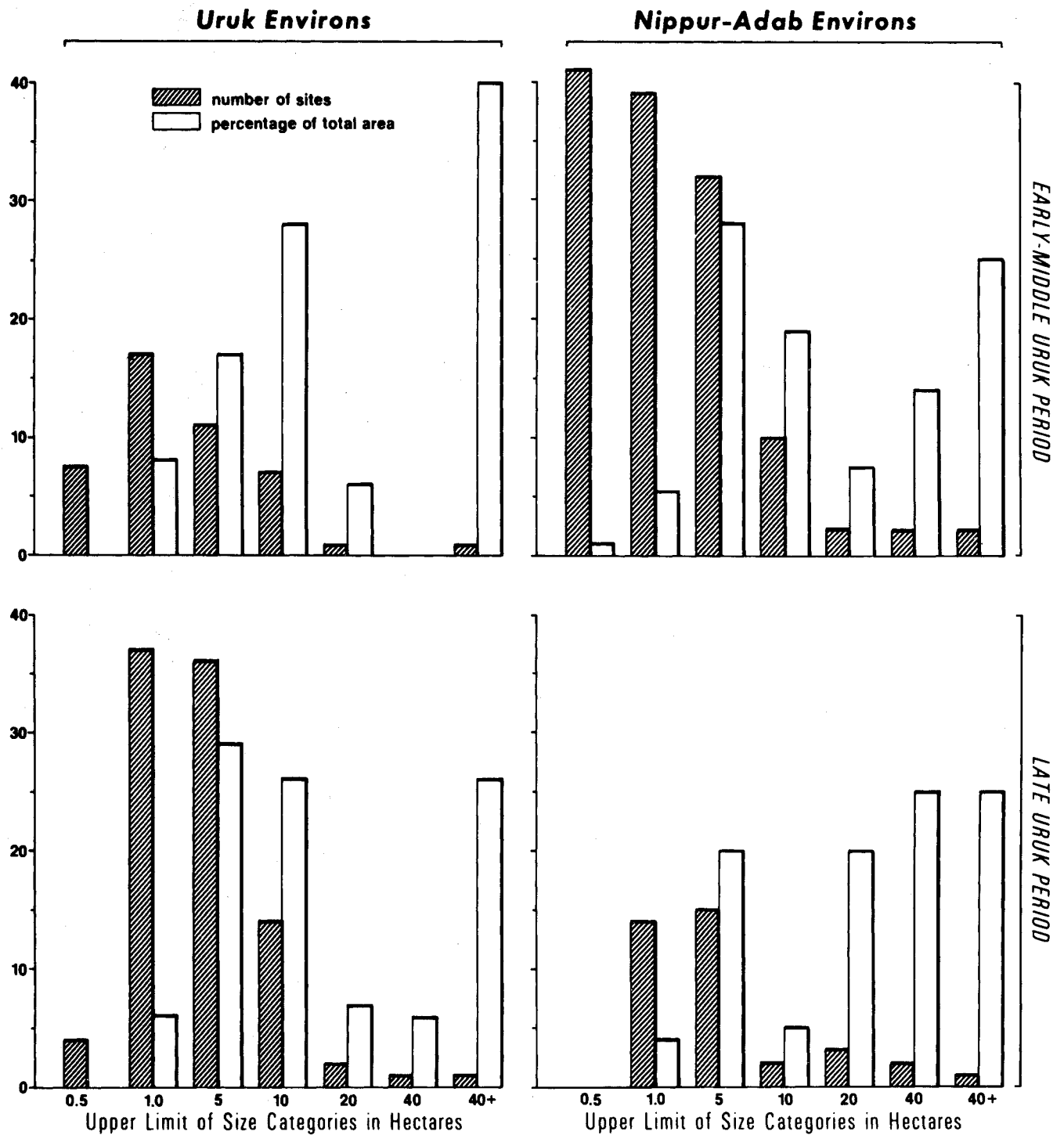


Fig. 16. Classification of settlement size by region in the Uruk period.

about twice as large as the next largest, ten times as large as the tenth largest, and so on. Plotting population against rank on double-log graph paper, systems of cities that follow this rule will describe a straight line with a downward slope of forty-five degrees. The existence of a harmonic progression of this kind, termed a log-normal distribution, generally is thought to reflect a condition of

regional balance dominated by neither the center nor the peripheries. It can be viewed, as Berry (1964, p. 119) and others have argued, as the outcome of a stochastic process—the condition toward which many small economic and social forces more or less rapidly move a system of cities.

Urban “primacy” is a feature said to obtain when the rank-size graph is concave instead of straight, or in par-

## Urban Origins

ticular when the largest city rises well above the general slope to which the lesser cities and towns conform. Its presence reflects the operation of stronger and perhaps fewer forces and suggests that encouragements to population growth or relocation are not evenly distributed through the system but concentrated at its center. Contrary to earlier expectations, Berry (1961) has shown that there is no simple relation between the type of city size distribution and the relative degree of economic development. As Skinner has observed, it "indicates an excess of centrality and suggests either an extraordinary centralization of regional services or a role for the primate city that extends beyond its regional hinterland" (1977, p. 238).

Thus it appears that primacy is to be thought of as a particular type of urban size distribution rather than as a necessary stage in the evolution of all urban settlement systems. It is a type, however, of particular relevance for this study. Its corollaries, succinctly noted by Crumley (1976, p. 64), at least initially appear to be that "fewer

forces will affect the urban structure of a country the smaller the country, the shorter the country's history of urbanization, and the simpler the economic and political life of the country. All of these instances might logically be applied in the case of early states."

Figure 17 plots the rank-size distributions of Uruk settlements by region as well as by phase. Uruk is clearly established as a primate city in the south throughout the Uruk period, although more pronouncedly so in the earlier part. While there is evidence of substantial growth in settlements of all sizes, in other words, the process was not uniform. Instead, there was a relatively more rapid increase in the size of smaller towns and villages than in the size of Uruk itself. In the north, by contrast, the Early-Middle Uruk period saw conditions very nearly the reverse of those around Uruk. Skinner's characterization of the kind of convex or "flattop" distribution occurring there is that it is "indicative of very imperfect integration at the level in question" (1976, p. 241). Subsequently there was a decline not only in the number of settlements but

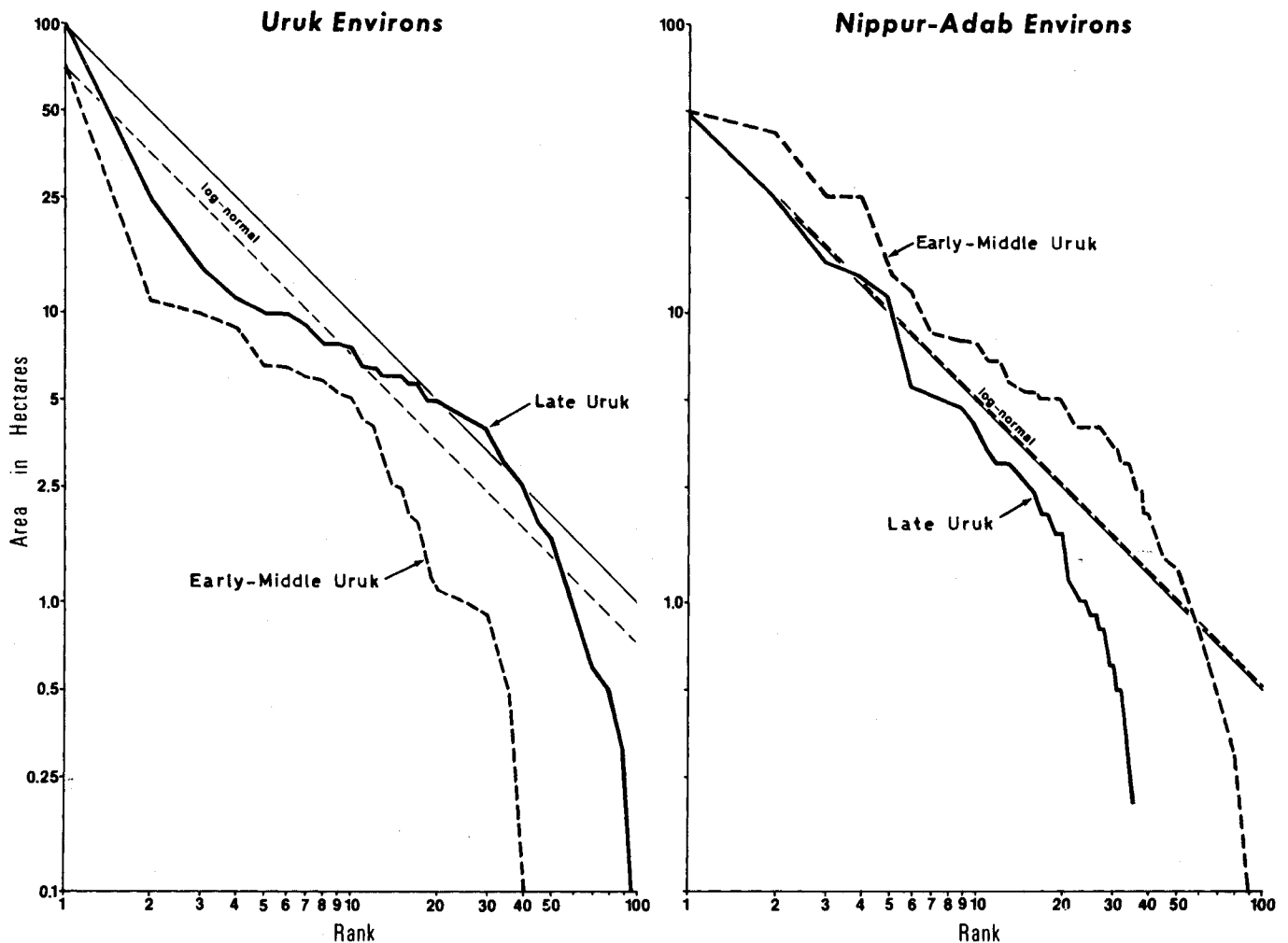


Fig. 17. Settlement rank size by region in the Uruk period.

in the size of most of them, so that by Late Uruk times something approaching a log-normal distribution seems to have obtained. Starting from markedly different rank-size distributions, in summary, the settlement hierarchies in the two regions gravitated in time toward each other—and toward a log-normal pattern.

Suggestive as this finding is, its imprecision must also be recognized. A degree of permanence probably can be assumed for most of the larger sites in the hierarchy, but there are corresponding difficulties in estimating the size of many of them because of massive overburdens of later debris. For the smaller sites, on the other hand, relatively greater accuracy in assessing the size of most of them is accompanied by greater uncertainty whether they were simultaneously occupied and hence can be arranged in a single hierarchy. A case could be made, if the data were less defective in these respects, for examining the apparent changes in intercept and slope value in the two contrastive distributions more rigorously to ascertain their statistical significance as a function of time (Malecki 1975). But while this is unjustifiable in the circumstances, the apparent changes have a bearing on Crumley's formulation of urban primacy as a characteristic of early state settlement systems. Inherent in that formulation, as she observes, is "the notion that the primate to rank-size growth model approximates the process of 'urbanization'" (1976, p. 66). Uruk and its hinterlands obviously reinforce the suggested sequence of development. The "flattop" distribution farther north is apparently just as early as Uruk, however, and is neither primate nor log-normal but something of an antithesis to both. Clearly, this difference is somewhat at variance with the proposal of a unilineal sequence of development, perhaps implying an early and persistent bifurcation of urban function. On the one hand, as Crumley envisions, are cities like Uruk that supply "functions"—the more abstract term explicitly extends outside the economic realm of goods and services to include organizational, religious, defensive, and other domains—to an agricultural hinterland in need of them. On the other hand, there may also be urban centers almost as large whose size is a function of the minimum threshold needed for a defensive agglomeration, or of a nonsedentary clientele in the hinterlands.

A further observation concerning the size of the settlement component that must be considered in some respects "urban" may be drawn from the last two figures. Zipf suggested that the lower threshold of urban size might well be set at the point at which the rank-size rule no longer obtained because the rank-size graph bent sharply downward (1949, p. 424). No consistent point or even narrow zone of sharp downward curvature is apparent in figure 17. A range between 3 and 5 hectares appears most plausible for the four cases, but almost a sixth of the entire number of known sites fall within this range, so that it is of little assistance. Moreover, this threshold

for distinguishing between urban and rural is drawn from observation of modern industrial systems, to which different regularities may well apply. Implying a definition of urbanism at population levels of only three to five hundred persons by the rough standard of equivalence here employed, it seems (on admittedly *a priori* terms) too inclusive to be useful in analyzing urban development that soon reached a level one hundred times larger. Setting any threshold at a higher population size can perhaps only be done arbitrarily at present, especially since it cannot yet be tested or buttressed with data from excavations illustrating differences in cultural inventory that are related to size of settlement. But it is surely not unreasonable to place at least a provisional line in the neighborhood of 10 hectares, about a thousand inhabitants. Bifurcating sites by area along that line, we obtain the pattern shown in table 4.

TABLE 4 Urban and Nonurban Settlement by Region in Successive Uruk Subperiods

	10 Hectares or Less ("Villagers/ Townsmen")	More than 10 Hectares ("Urbanites")
<i>Early-Middle Uruk</i>		
Uruk area	53%	47%
Nippur-Adab area	54	46
<i>Late Uruk</i>		
Uruk area	61	39
Nippur-Adab area	30	70

This tabulation implies that Uruk's dominance of the southern region was somehow linked to the greater dispersal of the population there into small settlements. Uruk's own growth notwithstanding, there was a trend away from urban concentration in its environs. In the north, by contrast, urban concentration increased even though there was simultaneously a general population decline. What may be a prototype of the later pattern of contending city-states, none of them able to find an assured, permanent basis for dominance but all of them together drawing the bulk of the sedentary population within their walls, is to be seen emerging as early as the Late Uruk period.

More generally, however, the above tabulation indicates the importance of an agglomerated—urban, by the definition here employed—mode of settlement throughout the Uruk period. Already in its Early (-Middle) phase, this can apparently be said of the place of residence of almost half the population, and in aggregate that level was maintained or even increased slightly in the Late

phase. Thus it can reasonably be said that the most salient characteristic of the Uruk period that we can yet identify, certainly in this data but arguably in the rest of what is known, is that the population and hence the society of the time was well on its way to becoming urban.

Assigning central importance to the thrust toward urbanism is admittedly primarily a descriptive rather than an explanatory step. Ruins much more extensive than any previously known bulk large in the data on the Uruk period produced by the survey, and there is a natural but perhaps overcautious predisposition to retain a descriptive framework that accurately reflects what is found. The presence of urban centers, no matter how numerous and rapidly introduced they may have been, does not by itself tell us much about the structural features and motive forces behind the rapid development. And ultimately the aim of science must be not merely to describe phenomena but to raise and answer questions of precisely that kind.

But there is an important distinction between immediate and ultimate objectives. Premature acceptance of an explanatory framework can focus attention on too limited a set of variables or can lead to recording only a selection of the relevant features of the behavior of those variables. Particularly in a study like this one, largely devoted to the primary recording of empirical findings, a more cautiously descriptive framework seems appropriate.

I maintained earlier, for example, that the histograms of settlement size (fig. 15) do not permit us to distinguish unambiguously the tiers of a hierarchy below something on the order of 10 hectares. That tends to direct attention toward urban phenomena that were concentrated exclusively in the larger communities and to imply a polar separation between them and the smaller ones. I concede that this is unfortunate. But at this stage it does not seem either to be more responsive to the data or to provide greater analytical penetration simply to impose graded hierarchies in spite of existing variance and then to reify them into bounded categories of behavior.

In a sense, to be sure, science very often proceeds by tentatively establishing categories and then testing their significance in domains independent of the one to which they were first applied. That procedure is implicit in Gregory Johnson's attempts to demonstrate a correspondence between his proposed levels for an Uruk settlement hierarchy in southwestern Iran, the cultural inventory of sites at different steps in the hierarchy as revealed by excavations, and other regularities of spatial patterning. But there are unmistakable overtones of reification and circularity in such an effort, particularly when, as in this case, the support rendered by supposedly confirmatory phenomena is still sharply limited by their modest scale and frequency. Working with a much smaller and therefore less continuously distributed series of site sizes, he has distinguished large and small "centers" as well as large and small "villages," all within the range of less than 10

hectares of total size (Johnson 1973, p. 79). This then is treated as the primary evidence for a three- or four-level settlement hierarchy, and the latter in turn is used as supporting evidence for a corresponding number of levels of decision-making and hence for the existence of the state as a form of territorially extended political organization (Johnson 1973, p. 141). Attractive as the idea of a "testable" definition of the state along these lines may be, it is hard to avoid the impression that the evidence so far assembled on its behalf is quite unconvincing (cf. also Crumley 1976).

Johnson's position is of broader interest than merely for its divergent interpretation of Uruk settlement hierarchies. He defines a state as a "differentiated and internally specialized decision making organization which is structured in minimally three hierarchical levels" (1973, p. 2), and the state's emergence as early as in Early Uruk times is then equated with the introduction of tripartite information-processing and decision-making. One might infer that the primary task of the archaeologist investigating the Uruk period is to test this proposition by seeking out material relics that can be inferentially associated with hierarchically structured tripartite (or, even better, quadripartite) distributions of behavior. The objective is indeed a good one, but it is to be regretted that the ancient Uruk inhabitants were seldom so obligingly differentiated in the refuse they left behind for us to recover.

While this is in no sense a theoretical treatise, reference to Johnson's work requires a brief excursus upon the larger problem-setting to which it is a central contribution. A recent review of studies of the origin of the state provides a useful starting point, for its author not only shares Johnson's general position but relies in part on the same body of Uruk period data from Khuzestan.

Uruk society is an example of early state society, according to Henry Wright also, as compared with the taxonomically simpler and less centralized "chiefdoms" out of which it is usually proposed that states emerged more or less independently in a number of different prehistoric and historic sequences (Wright 1977). Wright eschews any concern for urbanism as it relates to the state. Following Elman Service, he believes that "urbanism, considered as population nucleation, evidently follows state origin and is correlated with the pattern and intensity of warfare between existing states." Similarly deprecated as fundamental properties of the state that are related to its emergence are class stratification, a formative phase of largely theocratic leadership, militarism, intensification of production, and a number of other factors that need not concern us here. Instead, and apparently exclusively, at least for definitional purposes, "a state can be recognized as a cultural development with a centralized decision-making process which is both externally specialized vis à vis the local processes which it regulates, and internally specialized in that the central process is divisible into separate activi-

ties which can be performed in different places at different times."

The phenomenon of the state, Wright maintains, must be defined in terms of processes through time. That leads him to "look at processes which control other processes: at the central decision-making or regulatory activity of the system of activities, rather than at groups, institutions or roles." What makes the Uruk period pertinent to this emphasis is that there is a variety of glyptic and ceramic evidence that can be interpreted as indicating that "an administration controlled the movement of goods from production points to assembly points and thence to central points for aggregation and subsequent redistribution." In fact, Wright believes, Uruk administrative networks can be defined. "Each had a major center in an agriculturally rich area, within which was a network of smaller administrative centers and production centers. Production in these networks was differently organized. For example, while some settlements seem to be primarily concerned with agriculture and moved their products through central pools into redistribution networks, parts of central settlements are concerned with ceramics production and move their products to agricultural settlements by non-redistributional means" (Wright 1977, pp. 380, 381, 383, 386, 387).

This is not the place to develop a comprehensive alternative approach to the study of the origin of the state, but an understanding of the Uruk period requires comment on certain aspects of Wright's position in theoretical as well as empirical terms. Its most attractive feature is that it remains at all times keenly responsive to the potentialities of the archaeological record (cf. Wright and Johnson 1975). Wright properly sees seal impressions, ceramic workshops, and site hierarchies not as discrete and unrelated traits but as indicators of social relationships that must be systemically related to one another. He further demonstrates that archaeological procedures permit us to take quantitative account of those traits, and so to approach a quantitative understanding of the behavioral patterns, social relationships, or both in which the traits were originally embodied. Stress on an information-processing metaphor for the state, viewed in these operational terms, should prove a valuable analytical tool for a considerable time to come.

But let us examine some of the difficulties. Although Wright indicates that his interest is in political evolution, he translates this into a central focus on, or even confines himself to, certain routinized elements of bureaucratic administration. In an earlier article, the subordination of politics to administration is made more explicit: "By 'administrative' we mean 'control,' thus including what is commonly termed 'politics' under administration" (Wright and Johnson 1975, p. 267). Nothing we know of the historic records of any society (wherever there are such records), however would allow

even the full battery of administrative routines (assuming optimistically that they could ever be known archaeologically!) to stand as surrogate for its political system as a whole. The routines not only constitute a gross oversimplification of politics but also provide a misleading picture—one lacking in the pervasive but volatile and usually unexpressed elements of contingency, calculation, and coercion. Similarly missing from the analysis, in the face of overwhelming evidence not only of its importance as a historic force elsewhere but of incontrovertible archaeological evidence that it was the predominant preoccupation precisely in the Uruk period (Nissen 1972, pp. 793–94), is any concession of a special role for religion and religious institutions. In spite of its operational attractions, therefore, Wright's definition of the central features of Uruk society as a state society is theoretically too narrow to serve as a guiding conceptual framework for us here.

There are, in addition, a number of substantive difficulties with evidence adduced in support of this general position. Critical to its support is the demonstration in the archaeological record of hierarchically organized flows of goods and services as well as (rather more intangible) "information." It was originally concluded that pottery production was an activity centralized in the largest sites, at least in the Uruk centers of southwestern Iran (Wright and Johnson 1975, pp. 279–80). Soon afterward, new data provided "relatively conclusive evidence of ceramic production on small settlements," although it still appears to have been much more heavily concentrated on large ones (Johnson 1976, p. 209). It was also argued that beveled-rim bowls were not merely convenient, ubiquitous Late Uruk index fossils with vague ritual connotations, but indications of a centralized, state-administered grain-rationing system like that which can be unequivocally identified from texts in late Early Dynastic times (Wright and Johnson 1975, p. 282). The observations used to support this argument, however, support various other alternatives with equal plausibility (Adams 1975c, pp. 459–60), and now the case for a primarily "ritual" identification of the bowls is being vigorously argued once more (Beale 1978). Clay cones used in wall mosaics are another item that has been taken as evidence of specialized administrative functioning (Johnson 1975, p. 319), although the distributional evidence appears to be consistent with a variety of ritual or public purposes as well as with their use as status markers independent of an administrative system (Adams 1975c, p. 458), and although the excavated examples overwhelmingly come from architectural complexes whose central buildings have formal features by which they are usually identified as "temples."

Finally, it is worth noting that excavations at small Uruk sites in Iran are beginning to produce "unexpected" data on social status differences. Substantial buildings as

well as relatively rare and valuable imports like copper and lapis lazuli are mentioned. Contrary to his own anticipations, the investigator has been led to suggest for at least one small Uruk agricultural village that "the relatively high status of some of its residents was independent of administrative function" (Johnson 1976, pp. 216-17).

In short, a number of useful avenues of investigation have been opened—but so far with inconclusive results at best. The case for a primarily administrative axis of development at the heart of the burgeoning growth and cultural achievements of the Uruk period remains exceedingly weak. I would add my personal view that it remains highly implausible, while also conceding that the Sisyphean effort to establish such a case may prove to be not only one of the most operationally rigorous of current approaches but also one of the approaches most productive of "unexpected" insights. At least for the moment, however, it seems significantly more responsive to the mass of the available data to remain with the primary "urban" characterization of the Uruk period that was applied earlier.

A central part of the strategy employed by Wright, Johnson, and others to investigate developments of the Uruk period in southwestern Iran has been to balance the ongoing excavation programs at major sites like Susa and Chogha Mish with small-scale soundings at a representative variety of the smaller settlements. Brief, problem-oriented enterprises of this kind have not received official encouragement in Iraq, so that the empirical findings referred to above cannot yet be checked and duplicated with material obtained in stratigraphic context from within southern Mesopotamia proper. It is of interest, however, to ask the same questions of surface collections obtained from Uruk sites within our region. Table 5 assembles the data currently available for doing so, recording certain categories of imported materials and other possible indicators of social status or specialized activity by presence or absence. The validity of attributing surface materials to a particular period is obviously a matter of question, but the table takes note of sites whose surface collections we can rely on more confidently because typologically similar material of later date is not attested.

The table lends support to the suggestions emerging from Johnson's recent work that patterns of distribution are complex and fail to reflect a centralized, hierarchically organized system. Ceramic production clearly was not confined to the major sites but was very widespread, occurring on sites as small as 0.2 hectares in area. Copper also is present on extremely small sites. The use of stone bowls, an item of at least modest luxury, since the raw material was entirely unavailable in the alluvium, apparently was all but universal. Carefully ground stone mace-heads, arguably a status indicator or an item of

specialized military equipment, in three cases occur on sites of less than a hectare. Wall cones occur repeatedly on sites of the smallest size category as well as larger ones. Obsidian from the Lake Van region of eastern Anatolia (cf. site 1072 in the general site catalog, chap. 7) was perhaps a utilitarian rather than a luxury import, but it came from a sufficient distance so that selective use would be expected. It was indeed found only sporadically, probably because of difficulties in maintaining uniform standards for observing small, dark fragments during a rapid surface reconnaissance. But there is no obvious relationship between the sites where its presence was noted and hierarchies of site size. Even if we consider groupings of these indicators rather than individual categories, there is at best a very loose positive association with increasing site size. At least four of the six categories are represented on thirteen sites. While seven of these sites are 6 hectares or more in area, the remainder are smaller—in one case less than a hectare.

The lack of a close or obvious relationship between the hierarchy of sites and the patterns of distribution as they are currently understood is reinforced if we consider certain categories of mass production. Clay sickles and beveled-rim bowls are dealt with in detail in Appendix A because of their relevance for chronological questions, but the essential findings can be briefly recapitulated. Beveled-rim bowl frequency is not positively correlated with site size, as it probably should be if these vessels were employed in a centrally administered rationing system, and their manufacture occurs on sites as small as 0.5 hectare. Clay sickles, peaking in frequency somewhat earlier, were even more widespread in their manufacture. Nor is there any evidence that fragments were more numerous on the smaller sites, as might have been expected if there were a significant proportion of non-agricultural specialists in the larger centers (note, however, that frequencies are not available for the largest category of centers).

Granting the imprecision of a record of this kind, the data provide little support for a hypothetical dependence of the territorial system of settlements on a centrally organized flow of goods and services. A better case can be made that the primary basis for organization was of a rather more traditional kind: religious allegiance to deities or cults identified with particular localities, political superordination resting ultimately on the possibility of military coercion, or a fluid mixture of both.

This is not to imply that the only decisive developments of the Uruk period lay in the spreading influence of cults, or in the claim of larger centers to political and economic suzerainty over weaker neighbors. There was, as we have seen, an extremely rapid growth of the sedentary population that sustained these new, territorially extended relationships. Behind that must lie important innovations in agricultural practices, even if at present we can do



TABLE 5 Possible Indicators of Status and Specialization in Uruk Period Surface Collections

SITE NO.	MAX. URUK SITE AREA (HA.)	URUK ONLY	CONES (LC)	WASTERS (LH)	OBSIDIAN (NE)	STONE BOWLS (NA)	MACEHEADS (NB)	COPPER (O)	SITE NO.	MAX. URUK SITE AREA (HA.)	URUK ONLY	CONES (LC)	WASTERS (LH)	OBSIDIAN (NE)	STONE BOWLS (NA)	MACEHEADS (NB)	COPPER (O)	SITE NO.	MAX. URUK SITE AREA (HA.)	URUK ONLY	CONES (LC)	WASTERS (LH)	OBSIDIAN (NE)	STONE BOWLS (NA)	MACEHEADS (NB)	COPPER (O)
020	5.					+			247	0.1							+	837	1.4	✓			+	+		
023	1.	✓				+			260	14.		+						845	8.	✓	+					
028	2.9					+			262	3.5					+	+		853	4.	✓				+		
042	3.	✓				+			264	1.9					+			939	2.4	✓		+		+	+	+
048	0.5					+			267	0.3					+			940	1.7	✓		+	+	+	+	+
051	3.6	✓				+			272	0.5					+	+		975	5.8	✓		+	+	+		
060	1.8	✓				+			274	1.1	✓				+	+		1020	8.2	✓		+	+	+		
082	0.5		+			+			276	0.5					+			1046	8.6	✓				+		
087	7.8					+	+		282	2.6					+			1072	3.4	✓	+	+	+	+		
107	2.6					+			285	0.9							+	1100	0.5					+		
109	5.2	✓				+	+		292	1.9					+			1118	0.6	✓		+				
110	9.	✓				+			293	1.7		+			+			1124	6.8	✓	+	+			+	+
118	5.3	✓		+					297	1.6					+			1137	3.8			+		+		
125	24.		+	+		+	+	+	305	0.1		+						1154	2.6	✓		+				
126	4.					+			309	0.6					+			1159	4.5	✓	+					
127	4.					+			310	0.9					+			1163	0.9			+				
128	1.8			+					314	0.6	✓				+	+		1164	1.	✓		+				
133	0.2	✓	+						317	0.1	✓			+	+			1165	5.3	✓		+				+
137	1.5	✓				+			329	0.1		+						1172	25.5	✓	+	+	+	+		
144	2.		+			+			331	0.9	✓				+			1194	11.5	✓		+	+	+	+	+
152	6.6	✓					+		334	0.4	✓				+			1198	3.4			+		+		
153	2.		+						338	2.6	✓	+						1199	1.	✓		+				
160	0.4					+			339	0.1		+						1205	7.9		+	+	+	+		
162	6.					+	+		376	4.8	✓				+			1216	4.8			+	+	+	+	+
163	4.					+			386	1.5	✓				+			1217	0.1					+		
164	1.					+			406	0.8		+				+		1261	0.8	✓				+		
166	4.					+			407	6.		+						1293	5.	✓				+		
168	5.		+						573	1.	✓		+		+	+		1306	50.		+			+		
174	3.		+						574	1.	✓		+		+	+		1312	0.2	✓		+		+	+	
181	5.8		+			+			680	0.1	✓					+		1315	2.8			+			+	+
185	4.4	✓				+	+		711	0.1	✓				+			1383	1.					+		
191	4.	✓				+			765	5.3	✓			+	+	+		1394	7.7		+	+				
193	3.	✓				+			790	5.5	✓		+		+	+		1416	0.6	✓			+	+		
201	11.					+			792	6.8	✓	+	+		+	+		1432	1.7	✓		+		+	+	+
219	1.4		+			+			798	5.					+			1448	0.9		+	+		+	+	+
244	0.1		+						804	1.7	✓		+		+			1615	0.6					+		
245	6.		+	+		+	+	+	805	0.5	✓		+					A274	15.		+			+		

Note: Sites indicated as "Uruk only" were unoccupied during the succeeding Jemdet Nasr and Early Dynastic I periods, so that an Uruk dating can be assigned to the traits in question with considerable confidence. Kiln wasters were not recorded in the Warka survey (sites 001-466), nor generally at sites surveyed later where intensive collections were not made. This applies also to obsidian.

little more than speculate about what they may have been.

At least on the evidence of surface collections, chipped stone "hoes" (if that is what they were) continued throughout the period in undiminished frequency. Like the other stone utensils and even rough limestone boulders (now badly decomposed by weathering) that are almost always plentiful on Uruk sites, their transport into the plain as raw material or finished products represented a substantial basis for interregional contact, as well as a considerable investment. How did the use of "hoes" articulate with the use of ox- or donkey-drawn plows, clearly attested in Uruk pictographic writing even if none has yet been encountered archaeologically? It is tempting to suppose that some major agricultural innovation such as the plow, or perhaps an interrelated series of improvements in the technology of irrigation, sustained the precocious growth that is the hallmark of the period. But that cannot yet be demonstrated. And the ubiquitous clay sickles instead seem to point to a persistent, overwhelming concern with certain critical episodes of the subsistence quest, such as the harvest. All that can be said with certainty, therefore, is that there was a broad distribution of a considerable variety of artifacts displaying consistently superior craftsmanship. Verging yet once more beyond what can be shown with present evidence, this suggests that the basis for the productive achievements characterizing the impressive numbers of new settlements of the Uruk period lay in the proliferation of part-time specialists in communities of all sizes.

But what of the handful of major centers like Uruk? Status display, ritual, and administrative requirements surely reached their highest levels of complexity in these settings—always remembering that the three are likely to have been deeply "embedded" in one another rather than differentiated. In this respect the difference seems to have been qualitative and not merely quantitative. Whole classes of objects found in the major centers transcend craftsmanship and become art. As Henri Frankfort has said of the seals and seal impressions, they display a "creative power . . . such that we meet among [the] astonishingly varied products anticipations of every school of glyptic art which subsequently flourished in Mesopotamia" (1939, p. 23). Writing is a parallel case. Among the earliest pictographic tablets from Uruk are not merely crude records of economic and administrative transactions but formalized lists of gods, professions, geographic names, and classes of objects arranged in conceptual categories (Hans Nissen, pers. comm.). The list-keeping, classificatory aspect of cognition that permanently stamped scribal learning for as long as there was a cuneiform script thus had made its full-blown appearance here very soon after the script's origins, perhaps reflecting long familiarity with simpler counting

and mnemonic devices (Schmandt-Besserat 1977). Particularly with regard to the crafts and professions, moreover, a hierarchical arrangement of terms is apparent from the very outset. Three ascending ranks are separately listed (Nissen 1974, pp. 12–14), surely implying that they functioned within a well-defined institutional structure. These examples, and the uniformity with which they can be extended to other fields like stone sculpture and metal-working, clearly suggest something more than part-time craftsmen, scribal recorders, priests, and rulers or priest-rulers. In centers like Uruk a highly significant segment of the population must have been given or won its freedom from more than a token or symbolic involvement in the primary processes of food production.

While similar in the sudden appearance of technological as well as stylistic virtuosity, the example of metallurgy introduces an important further issue. The available evidence suggests that copper artifacts were much more widely employed than the other new arts. Well-made, sophisticated copper jar shapes, for example, can occur by no later than the Late Uruk period on a site of quite moderate size (e.g., site 185; cf. Adams and Nissen 1972, fig. 82), and unrecognizably corroded fragments are relatively common. In general they occur in and around shallow surface disturbances accompanied by human bone, seemingly indicative of illicitly excavated burials. By this time, therefore, copper vessels and other artifacts are likely to have been occasionally employed for personal use as well as for grave goods at least by some of the higher-status families residing in towns in the hinterlands as well as in the major centers. But it is less easy than in the case of stonework to suppose that they could have been fabricated locally by part-time specialists. The skills involved in casting, as well as the difficulties and costs of extracting the ore and bringing supplies of copper from the distant mountains of Iran or Anatolia, argue strongly for a concentration of the craft. Centers like Uruk not only concentrated demand for finished products but were best equipped to sustain the subsistence and raw materials requirements of skilled cadres of craftsmen over long periods.

This brings us to a function of towns like Uruk extending well beyond, although certainly complementary to, their political and religious roles. They must have played the crucial part in organizing the long-distance procurement of certain commodities like metals, wood for heavy construction, precious stones, and perhaps even ordinary flint and construction stone as well. That meant not only providing sustenance for craftsmen but organizing trading expeditions, even if "down the line" trade from one town to its neighbor may have limited the range to be covered. And trade demanded further production, since there were no significant Mesopotamian raw materials to be exchanged for needed imports.

Here, then, we see the Uruk system of urban centers and their hinterlands in a different light, rather closer to what Gregory Johnson and Henry Wright envisage than to the political and religious relationships that have been stressed above. A flow of resources had to be secured from the countryside: grain, domestic animals, other agricultural products, corvée labor, perhaps some finished or semifinished commodities like spun wool, woven cloth, hides, dried fish, reed mats, and beer. Other resources therefore must have traveled in the opposite direction: stone of various kinds, luxury goods to validate the status of subordinate local elites, copper tools, and weapons and vessels for utilitarian purposes as well as for conspicuous consumption. Without a reciprocal movement of goods and services of this approximate form, it is difficult to see how the surface distributions tabulated above could have been brought about. Indeed, it is difficult to see how else a hierarchically differentiated settlement system like this could have arisen and flourished so prodigiously.

The question on which this interpretation continues to diverge from Wright's concerns the incentives and instrumentalities by which the flow of goods and services was primarily brought about. Wright apparently feels that it can best be understood as a centrally administered system and that its two crucial, defining features were redistribution and a hierarchically organized array of bureaucratic functions. The different, though not entirely contrary, view offered here is that we are dealing instead with a much less simple, less stable mix of relationships between the centers and their peripheries. Among its features were: deities whose cults attracted pilgrimages and voluntary offerings; intervals of emergent, centralized, militarily based domination of subordinate centers that had been reduced to the status of clients, alternating with other intervals of fragile multicenter coalition or local self-reliance; coercive extraction of rural resources alternating with more or less freely balanced exchange of subsistence products of the countryside for status symbols and certain limited but important categories of utilitarian goods that could not be produced locally.

Assuming that something along these fluid, regionally differentiated lines obtained during the Uruk period, it seems misleading to characterize relationships between communities of different size in terms of narrowly specialized flows and routinized administrative relationships. State systems of varying size probably existed from time to time during the Uruk period. But the far more durable, pervasive Uruk characteristic was that it brought a large and growing population within the compass of an urban way of life. Urbanism, to be sure, denotes no set of precise, well-understood additional characteristics for societies so described. But that may even be an advantage in this case, when we still know so little.

## THE FIRST URBAN CLIMAX

We must now turn from characterizations of urbanism during the Uruk period to the sequence of even more impressive developments that followed soon afterward. The importance of the Uruk period, after all, lies not in institutional patterns reaching their culmination at that time, but in its enormous, diverse, comparatively well documented surges of development toward culminations occurring throughout the later span of Sumero-Akkadian history. Specifically with regard to urbanism, the growth trends that apparently were initiated in Early Uruk times reached their fullest consummation in the early third millennium. This is the process of growth that centrally determines the somewhat unconventional framework of periodization that has been adopted here. Rather than treating all of the Early Dynastic period as a unity, and linking it most closely with developments that followed in the later third millennium, it seems important to integrate the first of its three phases with the foregoing discussion of Uruk's rise to full urban stature.

Intervening between Late Uruk and Early Dynastic I is the Jemdet Nasr period, an elusive and probably brief interval to which the findings of a surface reconnaissance can contribute little. Its duration cannot be directly established from dynastic lists or radiocarbon series, but it is very unlikely to be more than a century or two. As is described more fully in Appendix A to this chapter, it is apparently not characterized by any widely occurring "index fossils" that do not also pertain to an earlier or later time. Single-period Jemdet Nasr sites can be distinguished, as can Jemdet Nasr occupations overlying Uruk occupations on the same site. But it is often impossible to be certain from surface collections alone whether Jemdet Nasr levels underlie Early Dynastic I levels at the same site, unless the latter occupation was of limited depth or was sharply reduced in extent from what it had been earlier. At many sites, therefore, the presence of a Jemdet Nasr occupation must be considered much more problematic than the succeeding and following ones. Statements about individual site sizes, not to speak of aggregate areas of settlement, are correspondingly more doubtful.

In spite of these conditions, the presence of an extensive Jemdet Nasr occupation in the hinterlands of Uruk could be relatively well attested. This is largely a result of subsequent large-scale abandonments accompanying the urban growth of Uruk in the Early Dynastic I period. As noted in the published findings of the Warka survey, the Jemdet Nasr period seems to have witnessed the apogee of relatively dispersed, rural settlement in the Uruk environs (Adams and Nissen 1972, p. 27). Since trends in settlement in that area extending through the

Jemdet Nasr period have already been analyzed in detail, they need not be recapitulated here.

Figure 18 reproduces the Jemdet Nasr period settlement pattern for the Uruk area but adds to it the extensive northern area more recently surveyed. Superficially it appears that by Late Uruk times the abandonment under way in the Nippur area had already continued further, at least if we consider only the definitely attested settlements rather than the doubtful ones. It should be recalled, however, that the Late Uruk map may include some sites that were given only a generalized designation as Uruk ("2/3/4" in table 7 of Appendix A to this chapter) and that may not have been occupied after the Middle Uruk period, accentuating the contrast with the Jemdet Nasr map. For reasons stated earlier, moreover, confining attention to definitely attested settlements may well result in a misleadingly large reduction in the total number of occupied sites as compared with that for the Late Uruk period. In addition, most of the sites that were abandoned were small, and at least two that were newly occupied (site 1032, although its Jemdet Nasr dimensions are uncertain) or reoccupied (site 1237) were of substantial size. Hence the first impression that there was a continuing decline in the northern region needs further scrutiny.

Let us consider only those sites that are definitely attested for the particular phase or period in question. On this basis there is a decline from thirty-seven, with an aggregate area of about 200.6 hectares, in Late Uruk times to thirty-one, with an aggregate area of about 177.3 hectares, in the Jemdet Nasr period. But if most of the questionable Uruk sites were Early (-Middle) only—as seems likely—and if no more than a portion of the ten additional sites whose doubtful Jemdet Nasr occupations are indicated by parentheses in table 7 were actually inhabited, there would have been essentially no further decline either in number of sites or in occupied area. Thus the overall picture of population density is rather similar to that around Uruk. The principal difference is the one already evident earlier, that in the north the trend was toward a number of coexisting urban centers of moderate size rather than toward a single major one like Uruk that exercised an influence far beyond its immediate supporting area.

This emergent regional contrast reaches a climax in the Early Dynastic I period. Uruk, already the largest center of its time, underwent a further phase of impressive growth. According to the traditions recorded in the Sumerian Kinglist, the "builder" of the city was Enmerkar, an early Uruk dynast whose reign must have fallen either toward the end of the period or at the very beginning of Early Dynastic II. The tradition is at least plausible. Several tens of thousands of people must have been persuaded or compelled to abandon their former towns and villages and inhabit the new city. Only

with their participation, again on an uncertain basis of persuasion or compulsion, was it possible for Enmerkar's successor, Gilgamesh, to undertake the construction of the massive wall defending it, still to be seen enclosing its ruins. The achievement suggests a strong ruler, whose connection with it would have remained alive in memory. The era, however, is on the remote edge of currently usable synchronisms and not wholly speculative conjectures as to absolute chronology, based on the spans of years assigned to following rulers. A dating for his reign in the early twenty-seventh century B.C. is at least indicative of where the chronicles, just verging out of legend and into history, seem to point.

Even the relative chronology is contentious and obscure at this juncture. Dynastic synchronisms are neither numerous nor unambiguous, and they must be balanced with partly countervailing considerations based on stylistic development, stratigraphy in the royal cemetery at Ur, and orthography. Absolute dating is still more unsatisfactory. Radiocarbon determinations are as yet few and beset with contradictions. Those currently available for the Jemdet Nasr period are inconsistent, probably because they are based on unreliable surface samples. And while there are five usable, closely grouped Early Dynastic I determinations, there is a considerable discrepancy between alternative calibrations of them. Use of the Suess calibration curve suggests that the end of Early Dynastic I and the transition to Early Dynastic II occurred about, or just before, 2900 B.C. The MASCA correction for the same five samples, on the other hand, indicates a date just before the mid-twenty-seventh century. Whatever the relative strengths of the statistical arguments for the two schemes, the latter at least has the virtue of conforming much more closely with the outcome of dead reckoning from the Kinglist (Wright 1973, pp. 200–201; Crawford 1977, pp. 8–9, 14–16).

Potentialities for interpretation are in one crucial respect decidedly better than they were in the Jemdet Nasr period. So-called solid-footed goblets, very largely limited in use to this period, were in widespread use. They constitute an excellent indicator of Early Dynastic I occupations even at sites with thick overlying levels of later debris. But along with this advantage must be mentioned two significant drawbacks.

The first is that, except for Uruk and a handful of other, generally much smaller towns, there are few sites on which the Early Dynastic I levels were either the latest or the most extensive. And while the solid-footed goblets unambiguously indicate an occupation at this time, the later remains at most of the larger urban centers often make estimates of size for this period little more than speculative.

Second, the greater duration of the period, together with the central fact of Uruk's enormous growth, creates a new series of ambiguities connected with the possibility

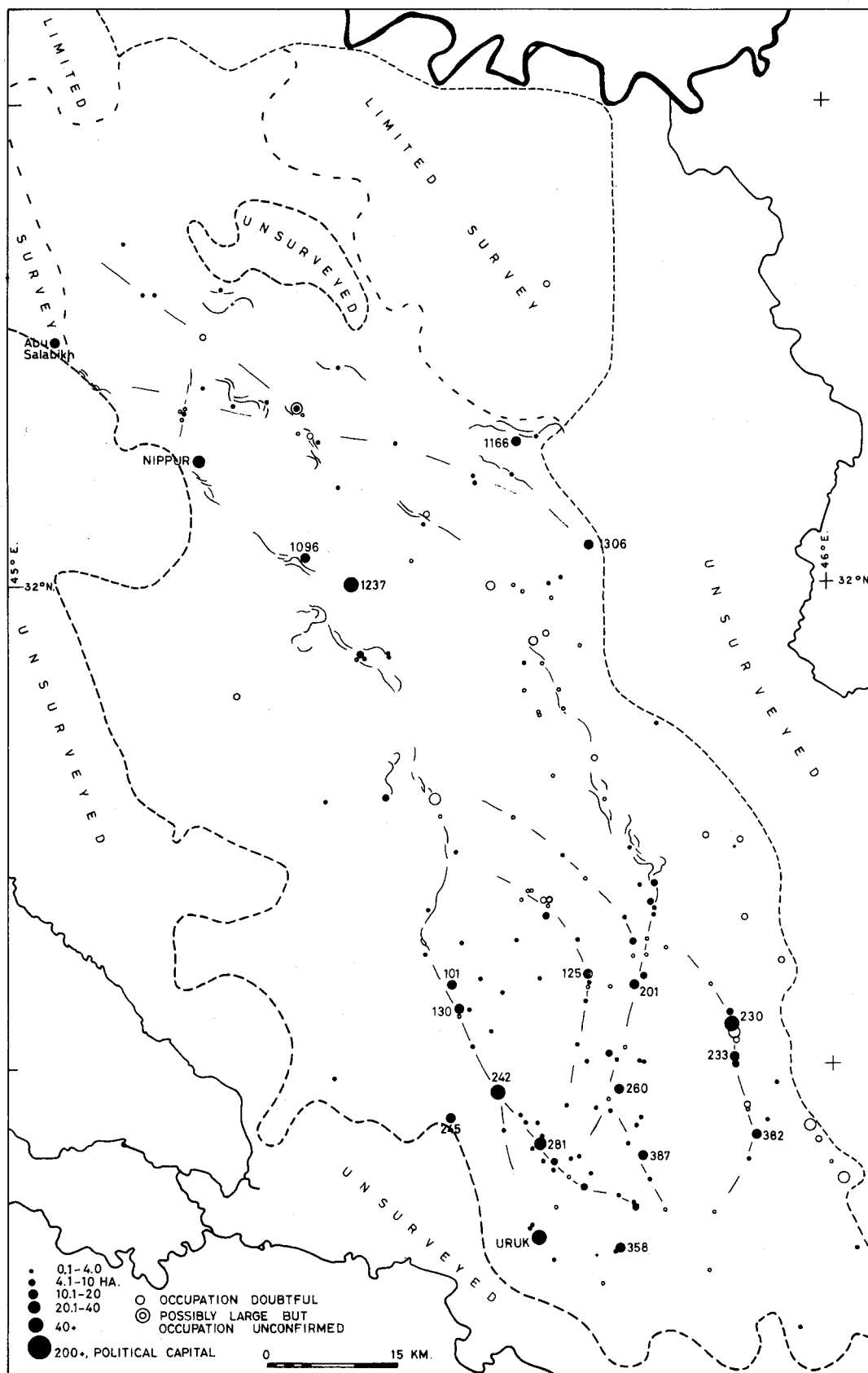


Fig. 18. Jemdet Nasr period settlement patterns.

## Urban Origins

of sequent rather than contemporary occupancy. Some 863 hectares of Early Dynastic I settlement have been recorded in the Uruk region, more than double the total for the Late Uruk period. But almost half of this is represented by Uruk alone. Since the latter grew by some 300 hectares late in the period, probably at the expense of the smaller settlements, the aggregate increase may have been only moderate.

Where was the new population of Uruk drawn from? We know that there were reduced terminal occupations on many Early Dynastic I sites, and that the somewhat larger settlements held on longer than the smaller ones (Adams and Nissen 1972, pp. 19–21). That may well argue against the coercive abandonment of whole districts and for a more amorphous or fluid process in which the new city had a greater appeal for rural peasantry than for those who were already settled in other towns. We cannot yet determine, however, what proportion of the outlying population had been drawn into Uruk as a basis for its greatly enlarged layout. Moreover, that process may have been only a reproduction on a substantially larger scale of shifts that occurred much more generally. Several smaller centers upstream from Uruk along the same river branch are also thought to have grown prodigiously at this time (sites 230–31, 242, perhaps also Shuruppak). About several others on a more easterly branch, the thick overburden of later debris limits us to assigning relatively modest site sizes with a large margin of uncertainty (Zabalam, 169; Umma, 197; Bad-Tibira, 451; in addition to sites 168 and 198). There is ample possibility, in other words, that much of the urbanization process either precipitated or followed abandonments

elsewhere, and that this movement toward successively larger centers climaxed in but was not limited to Uruk.

If so, however, it is at least possible that there were two or more successive phases of abandonment. The first led to movements from the countryside into many district centers. Subsequently there were further movements into the handful of much larger, militarily more potent urban nuclei. Just as Uruk in its most extended state was in large part a substitute for rather than an addition to earlier settlement, so, according to this reconstruction, the area of settlement outside Uruk and before its growth may be a composite. A misleadingly high total of settlement is reached if we neglect the possibility that later centers combined with and replaced earlier ones rather than adding to them.

Problems of this type are, to some extent, unavoidable when a surface reconnaissance compels us to work with relatively long chronological periods that cannot be subdivided by actual stratigraphy. They are exacerbated in this case, however, by the profound impact of Uruk's growth. Accordingly, it is difficult to analyze the settlement data in the same way as was done for the Uruk period, in spite of the relatively high degree of certainty as to which sites were occupied and which were not. As with estimates of population density, site hierarchies and rank-orderings depend for a great part of their significance upon the assumption that the individual components were largely contemporary in their occurrence (Hodder and Orton 1976, pp. 72–73).

With this apologetic preamble, figures 19 and 20 summarize the available data in a manner essentially similar

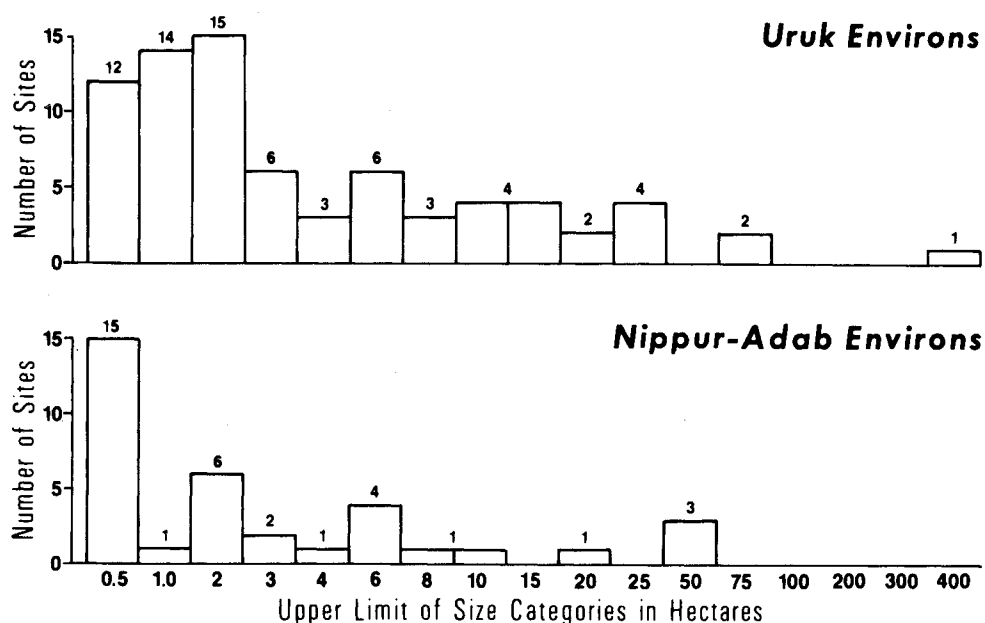


Fig. 19. Distribution of Early Dynastic I site areas by region.

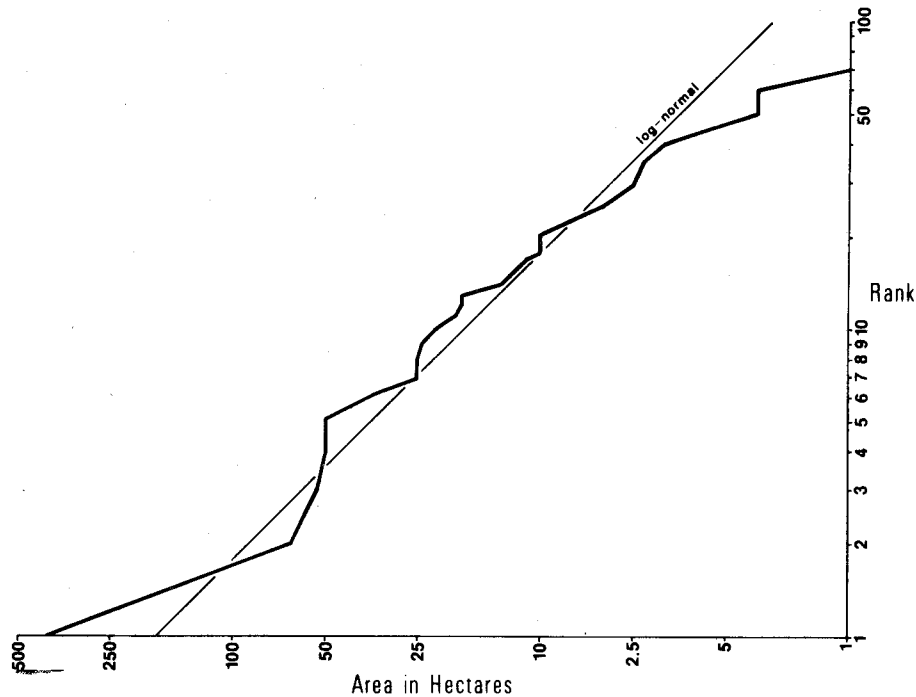


Fig. 20. Early Dynastic I period settlement rank size.

to that adopted earlier. The size units in figure 19 are slightly different at the upper end of the scale, partly to accommodate the increased size of Uruk and partly because of the difficulties I referred to above in measuring the size of some of the larger Early Dynastic I sites. Those difficulties perhaps account for some of the irregularity of the rank-size distribution given in figure 20. In spite of its roughness, the rank-size graph clearly indicates the position of Uruk as a primate city that must have dominated a wide region. If anything, in fact, the diagrammed distribution considerably understates its primacy in the latter part of the period, at a time when Uruk's enormous growth had been made possible only by the progressive collapse of the remainder of the settlement hierarchy in its surrounding hinterlands (Adams and Nissen 1972, pp. 19–21). Assuming that this process of urban expansion was accompanied by a greatly enlarged radius of dominance of the city over its hinterlands, it no longer seems reasonable to replicate the practice followed for the Uruk period (fig. 17) of plotting a rank-size distribution for sites within Uruk's immediate area alone. Hence the graph combines the northern with the southern regions.<sup>7</sup>

The unprecedented size of Uruk introduces problems

about the size of its sustaining area that heretofore have not been dealt with, even though the same problems apply in lesser measure to earlier stages of its growth as well as to other, smaller centers. Too little is known of Uruk's urban layout at this time for its population to be more than guessed at. Numerous public buildings of monumental size or large open areas within the wall (although some Early Dynastic I ruins extend outside it; cf. Nissen 1972, pp. 797–98) would sharply reduce the total. On the other hand, the constraint of living within the wall is equally likely to have induced higher population densities in residential areas than obtained in outlying towns and villages. At present, therefore, we can only hope to suggest the order of its size by assuming the same constant relationship between areal extent and population size that has been worked out—with much unexplained variance and no wide agreement even on averages—primarily for smaller settlements (Adams and Nissen 1972, pp. 28–30; see further discussion above, p. 69, and below, p. 144). Covering approximately 400 hectares (about 1.56 square miles), Uruk appears likely on this basis to have had a population of certainly no less than 40,000 to 50,000.

Further uncertainties appear when we seek to translate

the food requirements of a population of that order into the radius of the cultivated region that presumably surrounded the city. Bulk transport of agricultural produce for a considerable distance by boat or barge certainly would have been feasible, especially from subordinate towns or regions farther upstream, but the existing records provide no clue to its actual importance at this early period. Nor was agriculture the exclusive source of food; fish and the products of animal husbandry are certain to have contributed importantly as well. Particularly for fishing, one can argue that the very substantial growth of the industry was among the conditions that made Uruk's ascendancy possible. The term for fisherman, at least in Old Babylonian times and quite possibly already in the period under consideration here, also meant a military auxiliary serving under the crown. As Michael Rowton has perceptively noted, fishermen constituted a strategic reserve of military manpower, since their activities, unlike husbandry or agriculture, could be abruptly and indefinitely suspended in an emergency (1969, p. 309). A hypertrophic growth in their numbers, beyond what might be superficially considered adequate to meet Uruk's own need for fish as a source of animal protein, would thus significantly strengthen the city's politico-military posture. But products of cultivation are in any case likely to have been calorically and nutritionally the dominant components in the diet, and they provide the only available basis for an admittedly rough and provisional calculation of the breadth of the cultivated zone on which Uruk largely depended.

The component activities going on within this zone were clearly complex. To judge partly from contemporary but primarily from somewhat later cuneiform sources, the primary crop was six-row barley; its green shoots at an early stage were a source of fodder, and the mature cereal was consumed both as bread and as beer. Other grains, roughly comparable in productivity per unit area, included emmer, several other varieties of wheat, and millet. But in addition dates were surely an important food source, and date wine as well as grape wine was in use (Burrows 1935, pp. 10–11). Unlike grapes, however, the date palm appears to have been "perfectly adapted to the ecologic conditions of the region" (Guest 1966, p. 62). Hence the date palm, its fruit, and its by-products trace out a particularly complex, widely ramifying web that extends from the subsistence economy into many other branches of technology as well as into thought and art more generally (Landsberger 1967). Turning to other forms of more intensive garden cultivation, vegetables included onions (the basic term for garden—*ki-sum-ma*—is literally "the place of onions"), beans, chick-peas and other pulses, garlic, and a variety of other alliaceous plants as well as fruits (Deimel 1925 *a, b*; Jacobsen 1958, pp. 10–11). Higher productivity on these latter plots is suggested by the more careful and extensive preparation they re-

ceived, as well as by suggestions that they were equivalent in value to areas six times larger in ordinary fields (Edzard 1968, pp. 51–52). But on the other hand the areas are comparatively minor in relation to those devoted to field crops, often accounted for only in individual furrows and seldom amounting to more than a few percent of the larger cultivated plots in which they were situated (e.g., Bauer 1967, pp. 74–84). Adding together these divergent considerations, probably we can do no better than to consider provisionally the productivity of agriculture in general as only slightly higher than that of the barley crop that was its major component. In the same admittedly approximate terms, it is reasonable to follow Johnson's estimate, derived from measurements under roughly comparable dietary conditions among modern Arabo-Persian villagers in Khuzestan, that some 278 kilograms of barley represented the average individual consumption per year (1973, p. 97). An only slightly higher figure obtained as the standard subsistence allowance during the Third Dynasty of Ur (see below, p. 146).

On the basis of contemporary yields in Khuzestan averaging 1,153 kilograms per hectare, Johnson further estimates that the sustaining area per individual for barley alone was about 0.25 hectare, and he goes on to assume that the same amount in addition would have been sufficient to account for "gardens, orchards, other field crops, surplus barley production, fallow land, and so on" (Johnson 1973, p. 98). Some refinement in his calculations is possible by using recorded barley yields from late Early Dynastic Girsu. Crops in individual fields there are reported to have ranged between 742 and 2,794 liters per hectare and to have averaged 2,030 liters per hectare (Jacobsen 1958, pp. 36–37).<sup>8</sup> The average yield approximated 1,254 kilogram per hectare, 9 percent higher than contemporary Khuzestan. This might seem to indicate that even less than 0.5 hectares of cultivable land per person would have been sufficient. On the other hand, there is good evidence that a fallow system was just as integral a part of field cultivation in the third millennium B.C. as it is today. Jacobsen (1958, p. 65) has called attention, for example, to the fact that in late Early Dynastic harvest records for successive years a given field is ordinarily listed only every other year. With an allowance for fallowing, therefore, at least 0.35 hectare would have been needed to meet the primary producer's minimal subsistence needs in barley. Then there were additional grain disbursements of considerable magnitude. At least to judge from contemporary experience in the region, for example, 25 percent of the crop normally must be allocated to losses in storage. Further provisions of grain, currently averaging about 16 percent, must be fed to animals. Reserves for seed were even more indispensable, although the 11 percent currently withheld is probably much higher than was the case in antiquity (Poyck 1962, p. 53; Wright 1969, p. 21), and an almost equivalent amount of barley had to be set



aside to feed the plow oxen (Hallo 1976, p. 40). When all these factors are taken into account, something well over 0.5 hectare, perhaps closer to 1 hectare per person, would have been necessary for alternating barley and fallow fields alone. Additional although much lesser amounts of land also must have been set aside for other forms of cultivation.

But more important still, to an estimate of cultivable land per person we must add land that was not cultivated either because of submarginal productivity or because it was given over to pathways, and also canals, swamps, and steppelands that were not easy to irrigate. The amount of such land is never directly recorded, but it may be indirectly approached, again in the sole case of late Early Dynastic Girsu, by dividing what appear to be the total holdings attributable to the city by the population whose activities are listed in its archives. At least in this source the total—uncultivated as well as cultivable—land per person is on the order of 1.5 hectares per (adult) person (Adams 1965, pp. 23–24). And on this basis in turn we can estimate that the intermittently cultivated ring around Uruk would have needed to extend outward from the city's center for no less than 14 kilometers.

At this point, however, a new set of considerations enters, for 14 kilometers is well beyond the limits of commuting to fields daily. It presupposes temporary farm encampments that would have been in steady overnight use after the long days of the two most intense periods of agricultural labor, the sowing and the harvesting (Adams 1965, pp. 14–15). This distance is so great, moreover, that it may call into question the underlying assumption of regularity in patterns of land use. Chisholm, surveying a wide variety of sources on traditional agrarian societies, has calculated that net product generally falls by more than half when the distances between settlements exceed 8 kilometers, and he maintains that fields are unlikely to be cultivated at distances greater than 3 or 4 kilometers unless there is "some very powerful constraining reason which prevents the establishment of farmsteads nearer the land" (1970, pp. 112, 131). In the case of Uruk, the interest of the state in asserting unchallenged authority over the large, newly urbanized population it had recently brought together might represent just such a constraint. So might a prevailing condition of insecurity in the countryside. But is there anything to suggest a pattern of concentric zonation in which the seemingly heavy deterrents to cultivation of the outermost ring led to progressively more intensive agriculture as one moved inward toward the city walls? If not, how and why was the "virtually axiomatic" dependence of agricultural intensity and hence productivity on the size and proximity of population centers (Skinner 1977, p. 283) somehow avoided in these particular circumstances?

Archaeology is not yet of any help whatever on these matters, and the texts are, as usual, unconcerned with the

queries of the modern analyst and hence very elusive. Nothing locates individual gardens, orchards, or fields for us in relation to the late Early Dynastic city of Girsu, once again our only potentially informative example. But furrow-spacing and seeding rates are perhaps worth noting as at least indirect clues. While there was some variation, both point in the direction of a strikingly nonintensive, relatively uniform system. Furrows were positioned from 50 to 75 centimeters apart, for example, and individual seeds were planted more than 3 centimeters apart within the furrows. Seeding rates generally varied between 20 and 27 liters (12.3–16.7 kilograms) per hectare. The basis for the difference remains to be explained, but even the larger figure is little more than a third of the current standard in the same region and only a sixth of that in the United States (Pettinato and Waetzoldt 1975, pp. 278–81; Jacobsen 1958, pp. 62–63). Perhaps this may be partly explained as an adaptation to insecure irrigation supplies, but the very existence of summer-cultivated gardens and orchards attests to the capability of assuring adequate year-round water in favored locations. Why were similar investments of labor not devoted to intensifying the cultivation of the major food crops in areas most accessible to the city?

One possible answer emerges. It is of considerable importance for understanding the character of Uruk as a city, and hence highly regrettable that for the present it must remain quite speculative. Suppose that a considerable proportion of the lands around Uruk, or at any rate the entire outermost ring, was worked not by its own citizenry but by dependent laborers from the villages and steppelands beyond. Then the inducement to intensification would largely disappear, and the standardization of the process would be merely the normal impulse of bureaucratic control. But then we are brought face to face with the possibility that a correspondingly higher proportion of Uruk's own population was engaged largely in secondary and tertiary economic activities rather than in agriculture. And that in turn would imply a stronger role for the city in the economic integration of the countryside, as well as some fairly reliable administrative control over the necessarily quite distant settlements from which its vital supply of agricultural labor was recruited.

It must be stressed that this is a fairly speculative foray. The collapsing network of Early Dynastic I towns and villages in the Uruk hinterlands tends to contradict the idea of a stable, territorially extended base of administrative control. Indeed, the first consequence of stable political control should have been a wide dispersal of the rural population, rather than its aggregation in separate urban nuclei that not only reduced agricultural productivity but were at least potentially competitive. Most of the available evidence suggests that, even if agricultural labor was drawn from a ring of surrounding villages within a distance of perhaps 20 kilometers, the demographic and

economic impact of Uruk was largely concentrated within the same relatively limited area.

Turning northward, we are again thwarted by an inability to establish the size of most of the larger centers with any reliability. Kish, although outside the immediate area of this study, is likely to have already been of decisive political importance. "King of Kish" was a title later borne by some of the important rulers of southern Sumer during the Early Dynastic III period, by which time the large palace that has been partly excavated there lay in ruins. Hence its period of greatest power, if not population, occurred somewhat earlier. By Gibson's estimates, based largely on systematic surface reconnaissance, it increased in size from something less than 7 hectares composed of two separate settlements in Uruk or Jemdet Nasr times to a twin city of almost 60 hectares in the Early Dynastic I period. Complicating that estimate, however, are the somewhat more extensive remains of the Early Dynastic II/III period, which apparently total about 84 hectares (Gibson 1972, pp. 118–22, 266–67). Moreover, there is a strong possibility that the mounds he was able to record have been partly submerged by alluviation and originally were connected with one another to form substantially larger settlements. Tell al-Wilaya is another difficult case. Early Dynastic I remains are not reported by the excavators, probably because the relatively brief campaign at the site failed to penetrate below its uppermost levels. Hence there is no basis for assigning a size to it. Its isolated location north of ancient Adab is shown in figure 21 with the symbol for a small town (4.1–10 hectares), but this purely speculative estimate is not employed in any calculations of population distribution or density. Yet if Postgate's recent—highly plausible but admittedly not definitive—identification of the site with ancient Kesh is sustained by further work, this would be a significant omission. As he notes on the basis of seal impressions from the archaic levels at Ur, Kesh must have been "a major city in the ED I/II period" (1976, p. 81).

Nippur's occupation at this time, although of uncertain area, is well documented from an excavation sequence in which the earliest phase of the Inanna Temple overlies closely grouped Early Dynastic I private houses. Solid-footed goblets accompanying later debris on Adab's surface definitely also attest an occupation of some size. Around Adab a number of new settlements can be seen in the settlement pattern map of the period (fig. 21), the only example in this area of localized growth. It appears to argue that Adab had indeed emerged at this time as a center of some importance. Equally significant, it also suggests that the ingathering of countrymen into Uruk was no longer a force 65 kilometers to the north. Figure 19 therefore provides a separate histogram for the northern area, indicating the distribution of sites by size in an area beyond at least Uruk's demographic influences. But reference to the cluster of smaller settlements surrounding

Adab only heightens the anomaly of Nippur and perhaps Abu Salabikh. Already centers of very considerable importance, they appear to have had no near neighbors and virtually no dependencies.

The histogram for the Adab-Nippur region, conceding its speculative basis with regard to the major centers, indicates a continuing movement out of the countryside and into those centers. Apart from the Adab area, there were only a handful of small outlying settlements left by Early Dynastic I times; that handful virtually disappeared soon afterward. Even in the Adab area there was only one substantial but clearly subordinate town (site 1421), and that too failed to outlast the period. Yet, if the estimates given for individual site areas in table 7 are not very substantially in error, there was certainly no further decline in population in the north. Occupations are attested with reasonable certainty at thirty-five sites aggregating 212.4 hectares of settlement, slightly more than the Late Uruk total and probably also more than the Jemdet Nasr total. This stability is perhaps to be interpreted as further evidence that population movements around and into Uruk and those farther north were essentially distinct from one another.

Uruk's links with its smaller northern counterparts are thus likely to have been either religious, involving largely voluntary offerings, or politicomilitary, involving periodic reimpositions of tribute backed by threat of armed force, but not the steady, undramatic, cumulatively heavier costs of a colonial administration. This, at any rate, is the interpretation to which the stability of population in the north lends support. Had there been a genuinely unified regime over the entire region, moreover, the continuing trend toward urbanization in both south and north would be inexplicable. The entire historic record of Mesopotamian settlement makes clear that stable, centralized regimes promote dispersion of the agricultural population into the countryside, closer to the fields, rather than its concentration around towns and military strongpoints (cf., e.g., Adams 1965, p. 22).

We are dealing, therefore, with a discontinuous fabric of administration as well as settlement. Many communities had come (or been brought) together in a number of larger, more competitive but coexisting centers, including an altogether unprecedented conurbation around Uruk. But these centers remained weakly and perhaps only sporadically articulated with one another. Characterized by fluctuating ranges of political and economic influence, they formed neither a stable administrative hierarchy nor the core of an attached zone of continuous cultivation that might have required unified irrigation management. Impressive growth in the maximum size attained by the larger centers in successive periods presumably reflects, and indeed may have required, corresponding growth in administrative complexity or "density." That growth was largely localized within those centers and a few of their

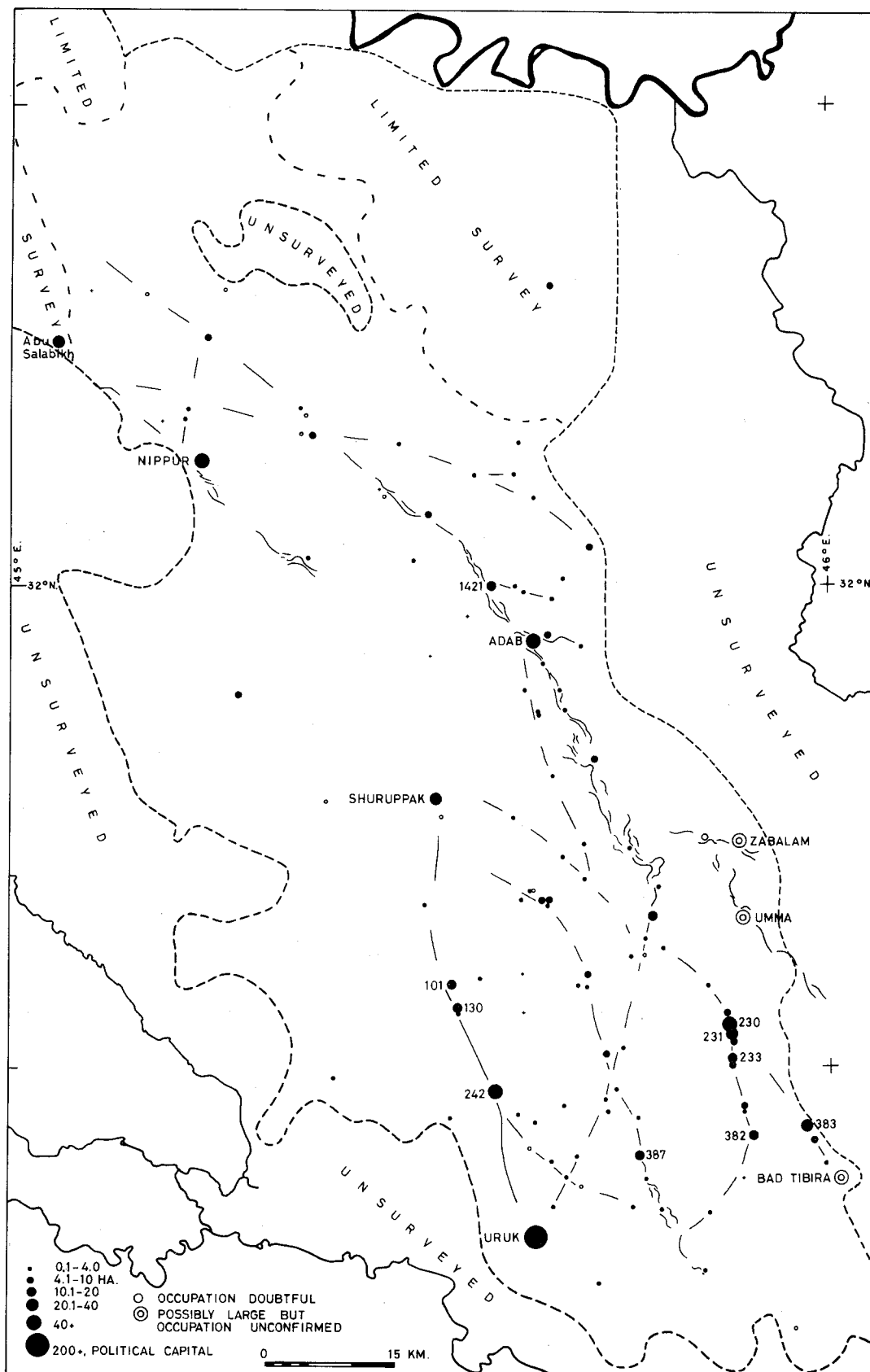


Fig. 21. Early Dynastic I period settlement patterns.

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nearer dependencies, however, rather than extending to distant towns and ramifying into the countryside. In other words, there was no regional system with regularly spaced cities as its transport, service, and administrative nodes. In spite of considerable intercommunication and cultural homogeneity, a tenaciously surviving element behind the kaleidoscopic shifts of population we have traced is that the settlement pattern remained a patchwork of constituencies.

Figures 22, 23, and 24 summarize the trends in settlement during the span of time primarily dealt with by this chapter, from the Early Uruk period through Early Dynastic I. They also document the existence of large intervening areas with neither settlement nor cultivation—areas whose location changed during an interval approaching a millennium in length, but that remained a characteristic feature in all successive periods. The analytical units utilized for these representations are cultivated areas rather than individual sites or the populations assumed to have inhabited them. To be sure, site locations and populations, the latter calculated on the basis of our aforementioned assumption of one hundred persons per hectare of site (or more accurately the rectangular area enclosing the site), constituted the essential input for the computer program by which these figures were generated. Taking our further assumption of 1.5 hectares per person as the minimum needed to cover subsistence needs in cultivable as well as unavoidably uncultivable land, this program has been designed to stimulate decisions on use of land involving minimal transport distances and hence the application of a uniform “least effort” principle in agriculture. For this I used an iterative procedure simulating regular growth in a two-dimensional plane around the individual sites as point locations. The nearest available unoccupied land around each site was systematically searched out by the computer, taking account of the simultaneous needs of its neighbors, in incremental units of population until the needs of even the largest cities have been met.<sup>9</sup>

Also suggested in this sequence of figures are boundaries for the major northern and southern enclaves of settlement whose similarities and differences have been a matter of concern throughout this analysis. The boundary lines themselves are of course only arbitrarily drawn abstractions, forming polygons intended to include the two major clusterings of sites and their associated areas of cultivation. The boundaries shift from period to period to take account of shifts in the patterns of settlement, but in all three cases they have been framed in essentially the same way and exclude only a handful of isolated, outlying sites. Hence the demographic characteristics of these polygons can be considered an alternative form of expression of the principal findings of this chapter, as shown in table 6.

Considering table 6 together with the sequence of fig-

TABLE 6 Changing Characteristics of Late Prehistoric and Protohistoric Settlement Enclaves

<i>Period</i>	<i>Northern Enclave</i>	<i>Southern Enclave</i>
Early-Middle Uruk	Area: 2,087 km <sup>2</sup> Estimated population: 38,540 Density: 18.47/km <sup>2</sup>	Area: 2,010 km <sup>2</sup> Estimated population: 20,110 Density: 10.00/km <sup>2</sup>
Late Uruk	Area: 1,619 km <sup>2</sup> Estimated population: 21,300 Density: 13.16/km <sup>2</sup>	Area: 2,231 km <sup>2</sup> Estimated population: 41,020 Density: 18.39/km <sup>2</sup>
Jemdet Nasr	(Ambiguities in data do not permit comparable estimates)	
Early Dynastic I	Area: 1,184 km <sup>2</sup> Estimated population: 20,240 Density: 17.09/km <sup>2</sup>	Area: 2,938 km <sup>2</sup> Estimated population: 86,300 Density: 29.37/km <sup>2</sup>

ures, it can be seen in summary that initially the largest population concentrations were in the north. Large and important centers, surely to be identified as already urban in many of their features, made their appearance almost immediately. A considerable proportion of the population, however, occupied a mosaic of smaller towns, villages, and outlying hamlets. As time went on the northern enclave at first underwent a sharp reduction, many of its inhabitants apparently moving south or southeast into hinterlands around Uruk that formerly were very sparsely occupied. Later the northern enclave tended to stabilize, although concentrating around a smaller number of centers and occupying a considerably reduced area. Meanwhile the area as well as the population of the southern enclave continued to grow, although one must bear in mind that a considerable proportion of the inhabitants of Uruk probably have been counted twice in the Early Dynastic I population aggregate, since they also are credited to the smaller settlements from which they originally came. But the single most striking characterization of the sequence is that relatively small, isolated pockets of land use coalesced into larger agglomerations. And the latter in turn were either engulfed or replaced by smaller numbers of still larger, more tightly consolidated zones, centering in most cases on the important towns of the early historic periods that followed.

Hence it is the continuing urbanization across the entire region that is the most striking feature of the Early Dynastic I period. Around Uruk in the south, at the apogee of the pattern, some 81 percent of the total of recorded settlement was in sites larger than 10 hectares. In the north, urbanized earlier as a by-product of the mass movement of the rural population south into the Uruk area, the proportion of such settlement held approxi-

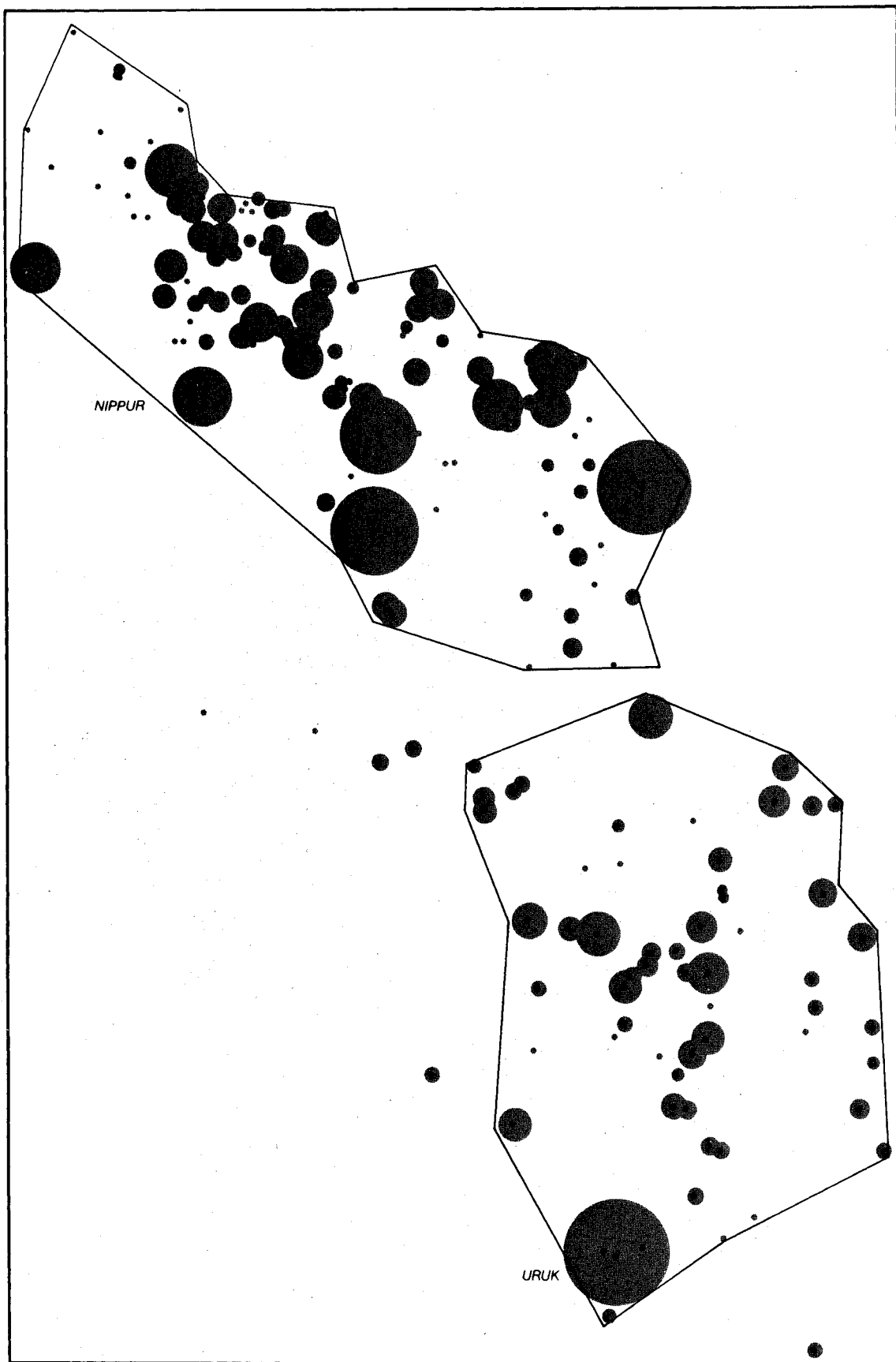


Fig. 22. Simulation of Early-Middle Uruk period cultivated areas.

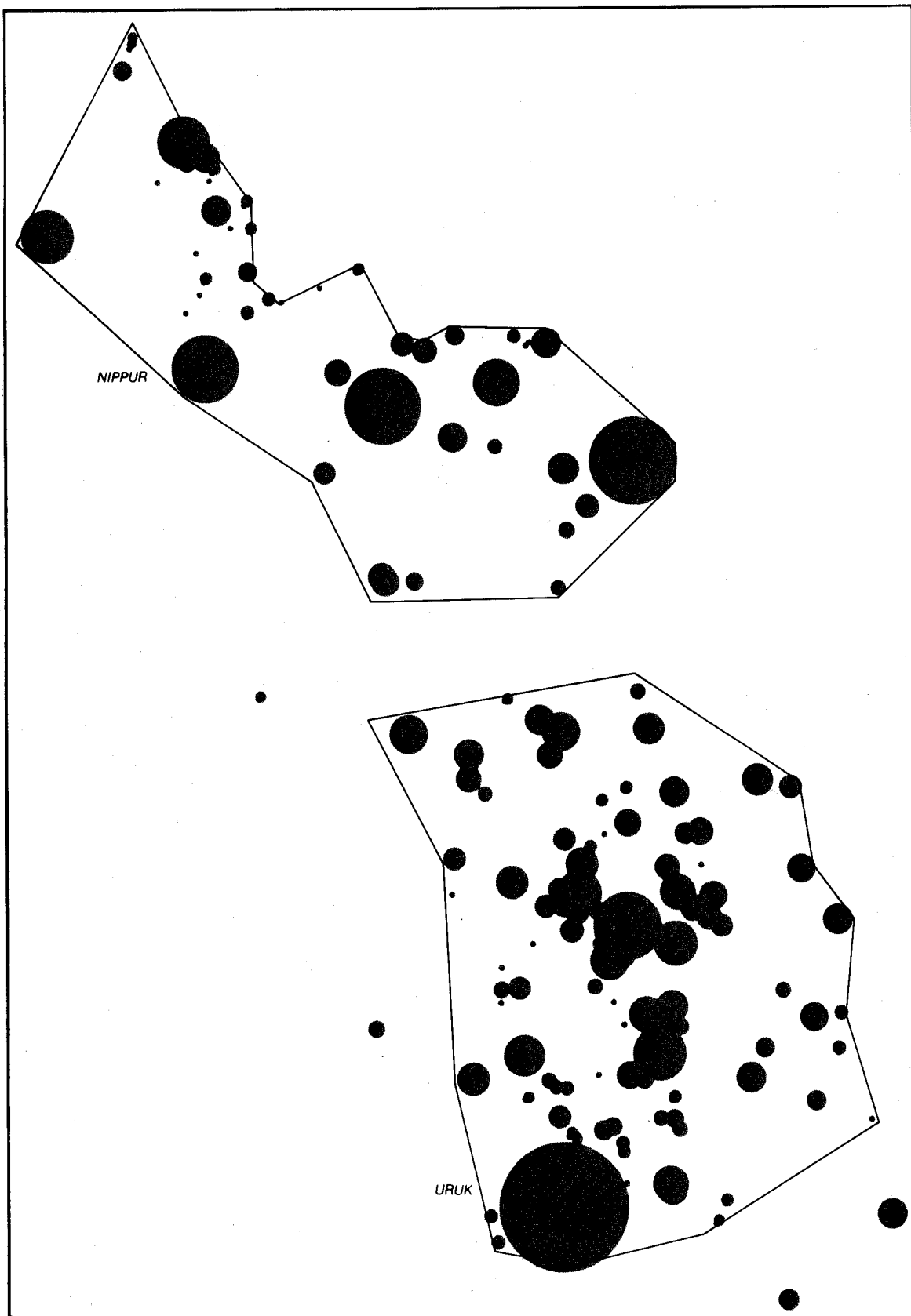


Fig. 23. Simulation of Late Uruk period cultivated areas.

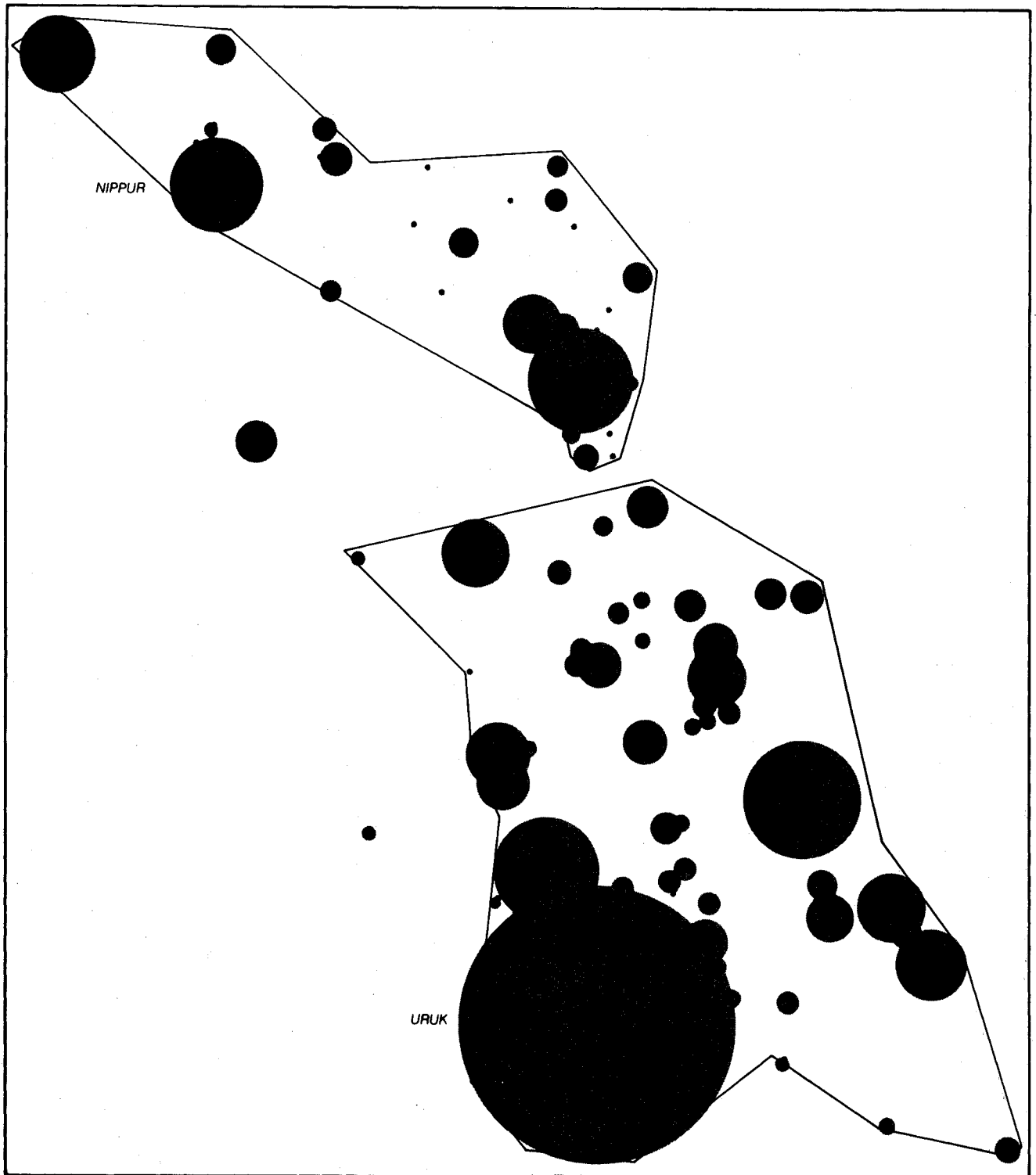


Fig. 24. Simulation of Early Dynastic I period cultivated areas.

mately steady at 71 percent. During Early Dynastic I times if not earlier, in other words, southern Mesopotamia had become the world's first predominantly urbanized society.

Why was this so? Is an explanation to be sought primarily in the internal dynamics of a few centers like Uruk—for example, in the attempt of urban elites to enhance their power and prestige by enlarging the number of people over whom they could exert immediate control? To what extent was urban growth instead a systemic, relational phenomenon, perhaps linked to the greater offensive and defensive advantages that larger and larger population concentrations conferred in a context of progressively worsening intercommunity rivalries? Was the final impulse that transformed Uruk into what was surely a major center of political power (if perhaps not a capital city in the formal sense) merely an episode in an essentially continuous process that was already under way in the Early Uruk period? Or were the forces responsible for its initial formation primarily of a religious character and therefore fundamentally different? If the latter, is Enmerkar's much larger city to be understood primarily as the relatively sudden, conscious imposition of a new form of settlement by a newly emergent political elite? Was it, in short, a social "invention" with enhanced adaptive potential under certain specified conditions for those who adopted it, or was it the more gradually emerging outgrowth of smoothly evolving productive forces and institutional forms?

Questions like these are given prominence and urgency by the data presented in this chapter, but they are largely unanswerable in the present state of our knowledge. The Early Dynastic I period has as yet received disproportionately little archaeological attention, and, except for those from Ur, the texts yet discovered to guide the interpretation of prevailing institutions and social conditions are also relatively very few and poorly understood. Nor can we dismiss the possibility that there were ongoing environmental trends that significantly speeded or otherwise influenced what has been described above as a process known and intelligible in demographic and social terms alone. Recently it has been urged, for example, that the period from 5500 to 3000 B.C. was characterized by "a considerable increase in precipitation as compared with today," whereas the following period until 500 B.C., after a moderately abrupt transitional interval, involved "a small decrease in precipitation as compared with today."<sup>10</sup> If this was so, it can hardly be accidental that widespread tendencies to concentrate in urban centers of unprecedented size coincided with heightened competition over reduced volumes of irrigation water.

But these are matters for a future research agenda, not to be resolved with the limited evidence of a surface reconnaissance. The achievement of urbanism is indisputable, and at least the basic quantitative dimensions of the process can be said to have been established. On this foundation a much refined and intensified program of further work can and should proceed forthwith.

## APPENDIX A

### THE SURVEY DATA BASE: URUK-EARLY DYNASTIC I SITES, COLLECTIONS, AND CHRONOLOGICAL INDICATORS

The developmental trends that are the substance of chapter 3 seem to have their inception in the Early Uruk period and to culminate in the enormous growth of Uruk as an urban center in the Early Dynastic I period. For the intervening span of time, the data most relevant to analyzing those trends have been assembled in this appendix. The reader may wish to refer to the general site catalogue (chap. 7) for additional descriptive material on individual sites, but the fuller, more systematic body of information on their size and dating will be found here.

Table 7 is concerned with three classes of information for all pertinent sites. The first is their apparent span of occupation within the Uruk-Early Dynastic I interval, as determined by ceramic and other dating criteria that are defined fairly systematically later in this discussion. Also included for sites occupied during all or part of this interval, to provide an element of continuity, are any occupa-

tions for which there is evidence during the preceding standard and Late Ubaid (Ubaid III and IV) or following Late Early Dynastic (Early Dynastic II/III) periods.

Second, the table lists specific dating criteria that were involved in making most of the individual site assessments, insofar as they were recorded (or could be identified later on collection photographs) rather than merely taken into account as an informal basis for dating during site visits. At some forty-seven of the sites listed in table 7, numerous (more than eight) criteria were observed whose presence suggest an Uruk or Jemdet Nasr period dating (or both). To simplify the lengthy listing, in these cases reference is given in the right-hand column to a separate display in Table 8. For thirty-six additional sites of the same date, quantitative (rather than presence-absence) tabulations were made possible by one or more intensive, localized surface collections. These are also indicated in the right-



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hand column, by reference to table 9, wherein the observed frequencies are tabulated. For brevity, the ceramic and other indicators used for dating are in all cases identified by letter codes, whose translations are provided in the text following table 9. The right-hand column also relates dating criteria to appropriate illustrations or descriptions in the earlier report of the Warka survey (Adams and Nissen 1972) and other publications.

The third category of data in table 7 consists of estimates of occupational area for successive periods and subperiods. All three of these categories involve substantial differences in reliability or degree of certainty from site to site, as well as from period to period within a site, and an attempt has been made to convey these differences as well

as the basic categories of data through the use of symbols shown in the key to the table.

In most respects, the dating criteria or "index fossils" relied on in this study are similar to those used in previous surveys. Hence a detailed discussion for each successive period may in some cases be partly redundant. The reader may wish to consult published accounts giving earlier versions of the basic sequence of diagnostic surface material (Adams 1965, pp. 126-34, figs. 11-16; Adams and Nissen 1972, pp. 97-104). Some effort is made below, however, to call attention to regional variations and to newer publications of material that permit improvements or modifications in earlier chronological understandings.

TABLE 7 Periods of Occupation, Estimated Areas, and Diagnostic Surface Materials for Late Prehistoric and Proto-historic Sites

### KEY

#### *Periods*

- 1 Late Ubaid (Ubaid IV)
- 2 Early Uruk
- 3 Middle Uruk
- 4 Late Uruk
- 5 Jemdet Nasr
- 6 Early Dynastic I
- 7 Late Early Dynastic (Early Dynastic II/III)
- / Periods on either side of slash cannot be differentiated with available evidence.
- ( ) Parentheses enclose poorly attested or doubtful periods, or periods of sharply attenuated occupation.
- T: "Trace" of occupation (1-2 sherds), possibly attributable to periods whose number designations follow the colon; no attempt has been made to estimate size of occupation where this symbol is used.

#### *Dating Criteria*

See pp. 116-27.

#### *Area of Enclosing Rectangle of Occupation in Hectares*

- ± Poor collecting conditions, overburden of later debris, or similar problems make indicated size relatively arbitrary.
- Following size estimate, indicates that occupation during this period or subperiod seemed less well represented (i.e., sparser dating criteria; possibly less dense settlement and/or shorter duration) than another period or subperiod for which the same size estimate is given.

#### *Warka Survey (Reanalyzed)*

	1	2/3	4	(5)	6	7	
004							AD, GB, HA,
Jidr			± 10.0 ha		± 10.0 ha		LG; many LA
006	(3)	4					
		0.3					
009	(3)	4					LA
		4.7					
012	(3)	4					
		7.8					

TABLE 7—Cont.

*Warka Survey (Reanalyzed)—Cont.*

013	(5)	6				AD, GB, NA
		2.0				
018	(3)	4	5			AC, AD
		5.8	$\pm 1.0$			
020	(2 3)	4	(5 6)	7		See table 8
Abu Boga'		$\pm 5.0$	$\pm 1.0$			
022	2					Adams and
	2.5					Nissen 1972,
						fig. 33; see
						table 8
023	2					See table 8
	1.0					
024	2					FB, LA, NF
	1.0					
028	(3)	4	(5)	6		AC, AD, EB,
		2.9		2.9		GB, JA, KF,
						LA, NA, NF
034	2/3					Many LA
	4.2					
041	T: 5	(7)				AD
042	1	2/3	4			Adams and
			$\pm 3.0$			Nissen 1972,
						figs. 34–36; see
						table 8; also HA
044	(3)	4	5			AC, AD, BA,
		0.8	0.8			DA, EB, ED,
						GA, LA
047	2/3/4	5	6			AD, GB, HC,
	$\pm 0.5$	2.0	2.0			LA
048	4	5	6			See table 8; also
	$\pm 0.5$	1.4				EF, GB, KB
051	1	(2 3)	4	(5)	6	See table 8; also
			3.6	3.6	$\pm 1.0$	EF, GB, HA, KB
053	T: 2/3/4					
054	T: 2/3/4					
059	6					GB
	$\pm 0.1$					
060	(3)	4	5			AC, AD, EA,
		1.8	0.5			EB, FE, GA,
						JA, LA, NA
068	5					AD
	4.0					
070	T: 2/3/4					LA
071	3	4				AC, AG, LA
	6.7					

TABLE 7—Cont.

<i>Warka Survey (Reanalyzed)—Cont.</i>					
076	(3)	4 2.0	5 2.0	6 2.0	AC, AD, EB, FE, GB, GC, JB, LA
077	(3 4 5 6) $\pm 0.1$				
078 Abu Dhuba'	(5) $\pm 2.0$	6			AD, GB
079	(5) 9.0	6			AD, FG, GB, MA
081	(5 6) $\pm 1.0$				AD, GB
082	(3) $\pm 0.5$	4	(5) 6.0	6	AC, AD, EF, GB, JA, KA, KF, LA, LC, LF, NA
083	2/3/4 $\pm 0.1$				JB—2, LA—1
086	(3) 4.2	4 4.2	5 1.0		AC, AD, EB, JA, KA, LA
087	(3) 7.8	4 7.8	5 7.8		Adams and Nissen 1972, figs. 37, 81; see table 8
091	5 2.9				AD, CF, NF
095	(3) $\pm 0.1$	4 0.6	5 0.6	7	AC, AD, GC, KA, LA
101	5 19.0	6			
102	5 $\pm 6.$	6 $\pm 1.0$			AD, GB, NA
103	2/3 $\pm 1.0$				LA, many MB
105	(3) 0.6	4 0.6	5 0.6		AC, AD, LA
106	(3) 1.7	4			AC, EB, JA, LA
107	3 2.6	(4) 0.1	5 0.1		AC, AD, FB, LA, NA
108	(3) 1.0	4			AC, LA
109	(3) 5.2	4			Adams and Nissen 1972, figs. 38–39; see table 8; also FF
110	2/3 9.0	4			See table 8

TABLE 7—Cont.

*Warka Survey (Reanalyzed)—Cont.*

111	T: 6					AD—1, GB—1
112	(3)	4				AC, LA
		$\pm 1.0$				
114	(3)	4	5			AC, AD, LA
		2.9	2.9			
115	(3)	4				AC, EB, LA
		1.7				
118	2					See table 9
	5.3					
119	2/3/4					LA, LH (LA)
	1.3					
120	2/3/4					
	2.0					
123	2/3/4					
	1.6					
124	2/3/4					
	2.6					
125	(3)	4	5	6		Adams and Nissen 1972, figs. 81, 82; see table 9; also EF, GB, KB
		24.0	18.0	$\pm 10.0$		
126	1	(3)	4	(5)	6	See table 9
			4.0		$\pm 0.1$	
127	(3)	4	5			AC, AD, LA, NA—1
		4.0	4.0			
128	(3)	4	(5)	6		See table 9
		1.8		$\pm 0.1$		
129	2/3	(5)				AD, BA/B, EB, LA, NF
	$\pm 1.0$	$\pm 1.0$				
130	5	6	7			AD, AE, AF, CF, GB, HC, LA—1, NA
	12.0					
131	(5)	6	7			AD
	$\pm 1.0$					
132	5					
	2.6					
133	(3)	4				AC, EB, LA, LC
		0.2				
137	1	(2 3)	4			Adams and Nissen 1972, figs. 40–43; see table 8; also HA
			1.5			
139	(3 4)	5				AC—1, AD
	$\pm 0.1$	$\pm 1.0$				
144	(3)	4	5			See table 8
		2.0	0.5			

TABLE 7—Cont.

*Warka Survey (Reanalyzed)—Cont.*

147	T: 6				
148	T: 2/3/4				LA—1, MA—1
152	(3) 4				AC, LA, NB
	6.6				
153	(3) 4 5				AC, AD, LA, LC
	2.0 2.0				
155	2/3/4/5				AD, LA
	± 1.0				
156	2/3				LA
	± 0.1				
160	1 (2 3)	4 5			AC, AD, EB,
		0.4 0.4			HA, HC, LA,
					LF, NA
161	2/3/4/5				AD (?), FG, LA
	0.1 0.1				
162	(3) 4 5 6				See table 8;
	6.0 6.0				also GB
163	2/3 4 5				Adams and
	4.0 1.6				Nissen 1972,
					figs. 44–47; see
					table 8
164	(3) 4 (5) 6				AD, FE, GB,
Jid	± 1.0 ± 1.0				LA, NA
166	(3) 4 5 6				AC, AD, EA,
	4.0 4.0				EB, FE, FF, GB,
					HC, LA, NA
167	2/3/4				
	0.1				
168	3 4 (5 6) 7				AD, LA, LC
Smid	± 5.0 ± 5.0				
169	3 (4 5 6) 7				AD, LA, LG
Zabalam/Ibzaykh	± 2.0 ± 2.0 ± 5.0				
170	T: 5				
171	2/3				Many LA
	± 1.0				
173	(2 3) 4 5				
	2.6 2.6				
174	3/4 5 6				EF, GB, HC,
	± 3.0 ± 9.0				KA, LA, LC
175	6 7				AD, GC
	± 1.0				
177	5 6				Adams and
	4.6				Nissen 1972,
					figs. 48, 82; AD,
					EF, FD, GB,
					HC, KA, KB,
					JD, OB

TABLE 7—Cont.

*Warka Survey (Reanalyzed)—Cont.*

178	1	2	3	5	Adams and Nissen 1972, fig. 49; see table 8; also HA
		0.7		0.1	
179	2/3/4	5	6		AD, EF, GB, KB, LE, NA
	$\pm 0.1$	$\pm 3.0$	18.0		
181	2/3	4	5		See table 8
		5.8	5.8		
183	(5)	6			AD, GB
Hammam		3.6			
185	(3)	4			Adams and Nissen, fig. 82; see table 8
		4.4			
186	2/3/4	(5)	6		AD, EF, GB, KA, KB, LA
	$\pm 0.1$		1.2		
187	(3)	4			
		0.6			
189	(5)	6			AD, GB, LE, LF
		$\pm 0.5$			
190	(3)	4	(5 6 7)		AC, AD, CA, EB, EC, FD, JB, JD, LA
Abu Bott	$\pm 3.0$		$\pm 1.0$		
191	(2/3)	4			Adams and Nissen 1972, figs. 50–51; See table 8
		4.0			
193	(2)	4			See table 8
		3.0			
197	2/3/4	(5 6)	7		LA, MB
Umma Jokha	$\pm 5.0$				
198	2/3/4	(5)	7		AD, LA, LC, LG
Umm al-'Aqarib	$\pm 5.0$				
199	5				AD, EB, HC, NA
	4.8				
201	2	3	4	5	Adams and Nissen 1972, fig. 52; see table 8
		11.0		11.0	
203	(3)	4			AC, EB, JA
		0.6			
206	(5)	6			AD, GB
	$\pm 0.2$	$\pm 2.0$			
209	2/3				AA, CE, IA, JA, JE, LA
	$\pm 1.0$				
212	5	6			AD, EF, GB, HC, KA, KB, LC
		6.8			

TABLE 7—Cont.

<i>Warka Survey (Reanalyzed)—Cont.</i>							
215	2						LA, LB, LC, LE
	0.1						
218	1	2	3	4			Adams and Nissen 1972, fig. 53; see table 8; also HA
		6.5		6.5			
219	(3)	4	5				Adams and Nissen 1972, fig. 54; see table 8
		1.4	± 0.5				
220	5						AD
	2.6						
229	2/3						LA
Qal'a Maltus	± 0.1						
230	2/3/4	5	6				See table 8; also
Umm al-'Ajjaj	± 1.0		53.0				AE, EF, GB
231	(5)	6					AD, EF, GB, KB, NA
	24.0						
232	5	6					Similar to 233
	7.4						
233	5	6					AD, EF, GB, HC, NA
	13.6						
234	5	6					Similar to 233; also CF, FD, JD
	4.8	± 1.0					
236	(3)	4					See table 8
		4.8					
237	2/3	4					AA, CA, IA, IB, JA
	0.9						
242	(3)	4	5	6	7		AC, AD, CF, LA, LG, NA, OB
Suheri		± 10.0		65.0			
244	T: 2/3/4						LA, LC
245	1	2	3	4	5	6	See table 9; also
Mismar			6.0		17.0	± 0.5	GB, GC; Schmidt 1978
247	T: 2/3/4						HA—1, LA—1, LB—1, OA
248	T: 2/3/4						
256	(4)	5	6				Adams and Nissen 1972, fig. 55; AD, DA, ED, FD, GB, HC, LA, LE, ND
	± 0.1		1.9				
258	2/3						LA, MA—1
	± 0.5						
260	(13)	4	5	6			AD, GB, LA, LC, LF; HA—1
Abu 'Ilba		14.0	14.0	± 3.0			

TABLE 7—Cont.

*Warka Survey (Reanalyzed)—Cont.*

261	(5)	6	7		AD, GB, LG
Abu Khawa		$\pm 2.0$			
262	2/3/4	5			See table 8
	3.5	$\pm 2.0$			
264	2/3	4	5	6	Adams and Nissen 1972, figs. 56–59; see table 8; also GB, HC
		1.9	1.9	$\pm 0.2$	
267	(3)	4	5		Adams and Nissen 1972, fig. 60; AC, AD, EA, FD, HA, MA, NA
		0.3	$\pm 0.1$		
272	(3)	4	5	6	See table 8; also EF, GB
		$\pm 0.5$	1.7		
273	5				CG, FD, LC
	0.1				
274	(3)	4			Adams and Nissen 1972, figs. 61–62; see table 8
		1.1			
276	(3)	4	5	6	Adams and Nissen 1972, figs. 64–65; see table 8; also GB, KF
		0.5	3.0		
277	5				
	0.6				
281	5				LC
	23.0				
282	(3)	4	5	(6)	See table 8; also EE
		2.6	2.6	$\pm 0.5$	
285	(3)	4	5		See table 8; also KB
		0.9	$\pm 0.3$		
286	(3)	4			
		0.5			
288	5	6			AD, GB, HC, JB, LC, NA
	6.0	$\pm 1.0$			
289	5				
	0.6				
292	(3)	4	5		See table 8
		1.9	$\pm 1.0$		
293	(3)	4	5	6	AC, AD, CE, CG, EB, FD, GB, LA, LC, NA
		1.7	1.7	$\pm 1.0$	



TABLE 7—Cont.

<i>Warka Survey (Reanalyzed)—Cont.</i>			
297	2/3/4	5	See table 8
	1.6	1.6	
305	T: 2/3/4		LC—1
306	(5)	6	AD, GB, KB, NA
		0.8	
309	(3)	4	CC, CF, EC, ED, FD, JC, JD, KC, NA
		0.6	
310	(3)	4	Adams and Nissen 1972, fig. 68; see table 8
		0.9	
		5	
312	5	(6)	Adams and Nissen 1972, fig. 69; see table 8; also EF, GB
	4.1	±2.0	
314	(3)	4	See table 8; also FF
		0.6	
315	T: 2/3/4		LA—1
317	2/3		LA, ME, NA, NE
	0.1		
318	2/3		EA, EB, LA
	1.1		
321	5		AD, NA, OA
	0.1		
325	4	(5)	AC—1, GB, HC
	±0.1	6	
		2.0	
327	5		AD
	2.2		
328	5		
	0.4		
329	2/3/4		A few LC, MB
	±0.1		
330	2/3		LA
	1.2		
331	(3)	4	See table 8
		0.9	
334	(3)	4	AC, CF, LA, NA
		0.4	
338	4		AC, LC
	2.6		
339	T: 2/3/4		LA—1, LC—1
347	5		AD, KA
	1.0		
350	(3)	4	AC, LA
		0.8	

TABLE 7—Cont.

*Warka Survey (Reanalyzed)—Cont.*

356	T: 2/3/4	5	AD—1, LA(?)—1
357	5 0.1		AD, NA
358	5 16.0		AD, GB (?), KA, LA
365	(5) 6 7 $\pm 0.5$		AD, GB—1, LG, NA
367 Abu Zumal	(3) 4 $\pm 2.0$		AC, LA
369 Umqtaif	5 2.6		AD, HC
370	2/3/4 5 $\pm 0.5$ $\pm 0.5$		AD, LA
372	5 6 2.5		AD, CG, EA, FD, GB, HC, NA
373	(3) 4 5 $\pm 0.5$ $\pm 0.5$		AD, FE—1, LA
376	(2) 4 4.8		See table 8
377	(5) 6 4.2		
378	(5) 6 1.0		AD, GB, KF
379	T: 2/3/4		LA—1
380	2/3/4 5 1.6 1.6		AD, LA, NE
382 Baydha	5 6 12.6		Adams and Nissen 1972, fig. 70; AD, BA, CF, EE, FB, FD, GB, HC, KA, KB, KF, MD, NA
383 Mansuriya	(5) 6 22.0		AD, EF, KA, NA
384 Twaimi	(4 5) 6 $\pm 0.1$ 6.4		AD, ED, EF, GB, KF, LA—1
386	2/3 4 1.5		Adams and Nissen 1972, figs. 71–72; see table 8
387	(3) 4 5 6 $\pm 1.0$ 11.0		Adams and Nissen 1972, fig. 73; AC—1, AD, EA, ED, EF, FD, GB, HC, LA, NA

TABLE 7—Cont.

*Warka Survey (Reanalyzed)—Cont.*

390	5 1.7	6		Adams and Nissen 1972, fig. 74; BB, CA, EE, EF, FD, GB, HC, NA
400	T: 2/3/4	6		LA—1, GB—1
401	5 1.0			AD, FG, GB (?)—1, GC—1 LA, NA—1
402	2/3 $\pm 0.5$			LA
404 Awayli	(5) 4.0	6		AD, EF, GB, GC, JB, KA, KB, KE, KF, LF
406	(3) 0.8	4 $\pm 0.1$	5	AC, AD, EA, EB, JB, KA, LA, LC—1, OB
407	(3) 6.0	4 6.0	5 6.0	AC, AD, GB, LA, LC, LF, HA—1
409	2/3 $\pm 0.1$	(5) 1.3	6	AD, EF, GB, IA, KA, NA
410	2/3 $\pm 0.2$			LA, FG
417	(3) 0.3	4		
418	(3) 0.4	4		
422	(5) $\pm 0.5$	6 2.9		Adams and Nissen 1972, fig. 77; EE, EF, FD, GB, IA, JA, KB, KF, NA
442	(5) 0.5	6		AD, GB
444	T: 2/3/4			LA—2
451 Bad-Tibira/ Medain	(5 6) $\pm 25.0$	7		AD
453	(3) 4.9	4 3.0	5	AC, AD, EA, EB, JB, LA
459	(1)			HA
460 Awayli	1 $\pm 1.0$	2 $\pm 1.0$	3 $\pm 1.0$	Adams and Nissen 1972, fig. 78–80; see table 8; also HA

TABLE 7—Cont.

*Warka Survey (Reanalyzed)—Cont.*

462	5 (6) 2.8 $\pm$ 1.0	AD, EF
465	(5) 6 2.9	AD, GB, JB, KB, KF
Raidu Sharqi	1 (2 3) 4 $\pm$ 0.5	von Haller 1932, pp. 35–37
Shuruppak/Fara	2/3 5 6 7 $\pm$ 1.0 25.0	Schmidt 1931, pp. 200–202, 211–214; also several LA
Uruk/Warka	1 2 3 4 5 6 7 $\pm$ 70.0 $\pm$ 100.0 $\pm$ 100.0 400.0	
Deheshiya	2/3 $\pm$ 0.5	von Haller 1932, p. 34
Bed of Shatt al- 'Ajauwiya	(3) 4 $\pm$ 0.5	von Haller 1932, p. 33
<i>Nippur Survey</i>		
517	T: 2/3/4	
539	4 2.0	AC, CC, CD, CG, EA, FG, JD, LA
562	T: 2/3/4	LA—1
573	T: 1 2 3 4 $\pm$ 1.0 $\pm$ 0.2	See table 9
574	3 4 1.0	See table 9
639	2/3 $\pm$ 0.1	A few LA; NE—1
653	T: 2/3/4	LA—1
655	2/3 $\pm$ 0.1	LA—5, widely scattered
662	5 0.2	
667	2/3 $\pm$ 0.1	LA—6
671	2/3 $\pm$ 0.5	A few LA
673	T: 2/3/4	LA—1
677	2/3 0.3	
678	2 3 4 13.5	LA, HB
680	1 2 0.1	BC/D, CD, CG, HA, LA, NB, NE
691	T: 2/3/4	NE—1

TABLE 7—Cont.

*Nippur Survey—Cont.*

692	T: 6	GB—1
706	2/3 ±0.1	LA—3
711	2/3 ±0.1	LA, NA— several
714	T: 2/3/4	LA—1
720	T: 2/3/4	LA—1
722	2/3    5    (67) 0.2    ±1.0	AD?
737	2/3/4 1.1	
738	2/3/4 1.2	Numerous LA; FE—2
740	2/3/4 ±4.0	Mostly LA
743	2 2.0	See table 8
744	2/3 3.6	CA, FB, HB, LA
745	2/3/4 0.6	
748	(4)    5 0.1    0.4	AD—many; CF?; LA—few
749	2/3 ±0.1	LA—some
765	2/3 5.3	See table 8
768	2/3/4 ±0.1	LA—several
778	2/3/4 ±0.1	LA, NE— several
781	2/3    5    (6) ±5.0   ±0.5	AA; AD—few; CA; GB?; LA, NA, NE. No AC, EB/C
782	2/3 ±0.1	LA—several; MA—1
783	2/3 ±0.1	LA
786	(3)    4    T: 5 0.6	AC, EA, EB, AD—1
789	T: 2/3/4	LA—1
790	3    4 5.5    5.5—	See table 9

TABLE 7—*Cont.**Nippur Survey—Cont.*

792	2 6.8	See table 9
793	2 0.4	AA, CA, LA
797	T: 2/3/4	LA—1
798	(5) 6 7 ±5.0	AD, BA, CC, FG, GB, GC, KA, KB, LG, NA
801	6 ±0.1	GB—several
802	2/3 ±0.2	LA—numerous
803	2/3/4 ±0.1	FG, LA— several
804	2 1.7	See table 9
805	4 0.5	See table 9
818	2/3 ±0.5	LA—numerous
821	2/3 ±0.1	LA—several
824	2/3 1.4	AA, LA, NF
826	2/3	LA, NE
al-Arsan	0.5	
829	2/3 0.3	
831	2 ±5.0	AA, CA, LA; no AC, EB/C
832	2 ±3.0	
835	2/3 2.9	FG—1; LA— many
837	2 1.4	See table 9
838	2/3 ±0.1	LA—several
845	2 8.0	AA, LC, NF; LA—many
853	2/3 ±4.0	LA; NA—1, NE—1
854	2/3 ±0.2	LA—several
858	T: 2/3/4	LA—2

TABLE 7—Cont.

*Nippur Survey—Cont.*

876	T: 2/3/4	LA—1
912	2 3.0	No AC, EB/C
924	T: 6	GB—1
928	(2 3 4)	
933	T: 2/3/4	LA—1
935	2 0.8	No AC, EB/C
936	2 0.2	AA, LA; no AC, EB/C
937	2/3/4 0.6	
939	2 2.4	See table 8
940	2/3 4 1.7 1.7	See table 9
944	T: 2/3/4	LA—1
945	5 0.1	AD
946	T: 2/3/4	LA—1
947	2/3/4 ±0.1	LA—several, widely scattered
950	(5) 6 0.5	AD—many; GB
951	(2 3 4 5) ±0.1	AD—1, HB—1, LA—several
952	2 5 0.2 0.2	AA, AD, CA, FF, IA, LE; LA—many
953	(5) 6 0.2	
954	T: 2/3/4	LA—1
959	T: 2/3/4	LA—1
960	T: 2/3/4	LA—1
961	T: 2/3/4	LA—2
964	2/3 0.7	
975	2 (3) 4 5.8 0.6	See table 9
976	2/3 ±0.2	LA—many
977	2 (3) 4 5 0.6 0.2 0.2	AA, BC/D, CA, CC, CG, FB, GA, IA, LA

TABLE 7—Cont.

*Nippur Survey—Cont.*

979	(4) 0.8	5 0.8	AD, HC, LA
980	2/3 0.8		
981	2 $\pm 1.5$		No AC, EB/C, HA/B
982	2/3 0.1		
1002	T: 2/3/4		LA—1
1005	T: 2/3/4		LA—2
1019	2 1.4		AA, EB/C, LA, LB, NF; no AC
1020	2 (3 4) 8.2 $\pm 0.2$		See table 9
1021	2/3 $\pm 1.0$		LA—many
1024	2 1.3		AA, CA, LA, NE, NF; no AC, EB/C
1027	2/3 $\pm 0.1$		LA—several, NE—1
1031	T: 4 7		AF—1, FF—1
1032	2/3 5 6 7 $\pm 3.0$ 29.0? $\pm 3.0$		AD—many, widespread; GB/C, LA, LE, LG, NE, localized
1034	2/3 2.6		LA—11 localized
1036	(5 6) $\pm 0.1$		AD—few
1044	2/3 $\pm 1.0$		LA—4, NE—1
1046	2 8.6		See table 8
1049	(5 6 7) $\pm 0.5$		AD—few
1050	T: 2/3/4		LA—1
1054	2/3 $\pm 0.1$		LA—few
1056	(5) 6 $\pm 5.0$		AD, GB
1059	5 3.7		



TABLE 7—Cont.

*Nippur Survey—Cont.*

1067	2/3 ±0.1	LA—few
1069	2/3 ±0.5	LA
1070	2/3 ±0.1	LA—few
1071	2/3 ±0.1	LA—few
1072	2    3    4 3.4	See table 9
1087	T: 6	GB—1
1095	T: 2/3/4	LA—1
1096	3    4    5    6	AA, BA, LA,
Umm al-Fugas	±2.0    11.5 ±2.0	NF; AD—many; GB—few
1099	(2 3 4)	
1100	2/3/4    5 ±0.5    1.8	AD—many, LA—few, NA—1
1103	2/3 ±5.0	LA—many
1108	T: 2/3/4	LA—1
1109	2/3 ±0.5	LA—some, NF—1
1112	2/3 ±0.1	LA—3
1113	2 4.0	Many AA, CA, LA, NE, NF
1114	2/3 ±4.0	LA—many
1115	2/3 ±0.5	LA
1118	2    (3) 0.6	See table 9
1119	T: 2/3/4	LA—1
1124	2    3    4 6.8 ±1.0	See table 9
1129	2    3    4    5 2.4    2.4	
1130	T: 2/3/4	LA—1
1131	(3)    4 ±3.0	
1134	T: 2/3/4	LA—1

TABLE 7—Cont.

*Nippur Survey—Cont.*

1135	2/3					LA—few
Rubahiyat al-Torra	±0.1					
1137	2	3	4	5	6	See table 9; also GB
	3.8		3.8	0.1		
1152	2/3					LA—3
Hamayma	±0.1					
1154	(2 3)	4				See table 9
		2.6				
1159	2					See table 9
	4.5					
1163	4					See table 9
	0.9					
1164	2	3	4			See table 9
	1.0		0.2			
1165	3	4				See table 9
	5.3					
1166	2/3	5	6			AD, LA—many; GB—few; LD, LE
	10.6	10.6	±2.0			
1168	5					AD—many; FG, GC, LA, NA
	0.1					
1169	2/3					LA
	±0.5					
1170	2/3					LA—many
	±0.5					
1172	2	3	4			See table 9
	25.5		25.5—			
1174	2/3	T: 6				GB—2, LA—3
	±0.1					
1178	2/3	(6 7)				AD—many; AE, CC, CG, GC, LA
	±0.1	±0.1				
1179	T: 2/3/4					LA—1
1180	2/3					LA—few
	±0.1					
1185	T: 2/3/4					LA—1
1194	2	3	4			See table 9
	11.5		11.5—			
1195	2/3					LA—3
	±0.1					
1196	2	3	4			LA—many; AC
	±0.5		±0.5			
1197	(3)	4	5	6		AC, LA—many; ED, FB, JB, LE, NC
		1.1	0.1			

TABLE 7—Cont.

*Nippur Survey—Cont.*

1198	2 5 3.4 0.1	See table 9
1199	2/3 ±1.0	AA, LA—many; CA, FG, IA/B, MB, LH (LA)
1205	2 3 (4) 5 6 7.9 ±2.0	See table 9; also GB, GC, KF
1207	T: 2/3/4	LA—1
1208	2/3 ±0.1	LA—several
1209	T: 2/3/4	LA—1
1210	2/3 ±0.1	LA—several
1215	(5) 6 4.8	AD, GB—many; ED, EF, FG, GC, KB, KF
1216	(3) 4 5 ±0.1 4.8 ±0.5	See table 9
1217 Dowayhis	2/3 ±0.1	LA—2, NA, NE
1219	T: 2/3/4	LA—1
1221	T: 2/3/4	LA—1
1230	2/3 ±0.5	LA—numerous
1233	T: 2/3/4	LA—1
1237 Dlehim	2/3 (4) 5 42.0 42.0	AD, LA—many; AA, CA, JA
1247	2/3 (5) 6 7 ±0.1 ±0.1	AD—many, GB, LA—few; AE, CF, FG, OB
1261	(3) 4 0.8	See table 9
1271	2/3 7 ±0.5	LA—many; AD, AE, AF
1272	T: 2/3/4	FE—1, LA—1
1278	2/3 6 ±0.1 +0.1	GB, LA
1284	2/3 ±0.5	LA—14
1291	T: 2/3/4	LH (LA)—1
1293 Abu Dhaba'	(3) 4 +5.0	LA—many; AC, EC, FE, NA
1294	2/3 0.8	LA—many
1303	T: 2/3/4	LA—1

TABLE 7—Cont.

*Nippur Survey—Cont.*

1304	2/3 ±0.1				LA—few
1306 al-Hayyad	2 3 4 5 6 50.0 50.0— ±20.0 ±5.0				See table 9; also GB, GC, KF
1312	2 3 (4) 0.2				See table 9
1315	(3) 4 5 2.8 0.5				See table 9
1316	2/3 5/6 ±0.1 ±0.1				AD, LA
1318 Hayyad al-'Alwi	2/3 ±0.1				LA
1337 Tell Khathale	2/3 7 ±0.1				BC—1, FB—1, LA—4
1353	3 4 5 4.2 4.2				AD, LA—many; CA, CD, EA
1354	(5) ±0.1				AD—few
1355	3 4 5 3.0 3.0				
1356	5 ±0.1				AD—few
1357	4 5 1.2 1.2				AC—1, AD— several
1358	T: 2/3/4 6				GC—1, LA—1
1372	T: 2/3/4				LA—1
1375	3 4 0.2				See table 9
1383 Bayt	2/3 7 ±1.0				AD, GC, KF— many; LA—6, NA—1, NC—1; AE
1386	2/3 5 (6) ±0.1 ±0.5				AD—numerous; LA—rare; AE, GC
1394	4 5 7.7 7.7				See table 8
1399	T: 2/3/4				LA—2
1405	T: 2/3/4				LA—1
1410	T: 6				GB—1
1413	T: 2/3/4				LA—1
1416	2 (3) 0.6				See table 9

TABLE 7—Cont.

*Nippur Survey—Cont.*

1421	(5) 6 18.0	AD, GB—many; FG, GC, KA, KB, KF, NA
1428	2/3 (5) 6 ±0.5 ±0.5	AD, GA, LA— several
1430	(5) 6 ±4.0	
1432	2 3 4 1.7 1.7	See table 9
1434	2/3 (5) 6 ±0.1 ±0.1	AD—3, GB—2, LA—4
1437	2/3 (5) 6 ±0.1 ±6.2	AD, GB—many; CC, EE, FG, GC, KA, KB, KF, LA
1440	2/3 (5) 6 ±1.0 ±1.0	AD, GB, LA fairly common
1442	T: 2/3/4	LA—1
1443 Barghasha	2/3 ±0.1	LA—few
1445	T: 2/3/4	LA—1
1448	3 4 5 0.9 0.9	See table 9
1450	(5) 6 7 ±2.0	
1451	2/3 (5) 6 1.4 1.4	AD, FG, GB, GC, KB, LA, NC
1454	(5) 6 2.1	AD, GB
1456	(5) 6 1.1	AD, FG, GB, LG, NF
1459	(5) 6 0.1	AD, AE, GB— rare
1460	2/3 (5) 6 0.1 0.1	AD, GB, GC, LA—rare
1465	2/3 ±0.1	LA—3, NE—1
1471	2/3 5 ±0.1 ±0.1	AD, LA
1571	T: 2/3/4	LA—1
1592	T: 2/3/4	LA—1, NE—1
1602	T: 2/3/4	LA—1, NE—1
1612	T: 2/3/4	NE—1
1615	3 4 5 6 0.6 0.2	See table 8

# Urban Origins

TABLE 7—Cont.

*Nippur Survey—Cont.*

1618	T: 2/3/4							LA—2, MB—1, NE—1
Adab/Bismaya	(2 3 4 5)	6	7					
		$\pm 50.0$						
Isin/Bahriyat	(2 3 4 5)	6	7					Hrouda 1977, p. 55
		$\pm 10.0$						
Nippur/Nuffar	1	2	3	4	5	6	7	
		$\pm 25.0$			$\pm 25.0$	$\pm 50.0$		
Tell al-Wilaya	(2 3 4 5)	6	7					
		$\pm 10.0$						

*Akkad Survey (Reanalyzed)*

A 221	2/3							Harris and Adams 1957
	±1.0							
A 259	2/3							LA—3, HA/B
	±0.2							
A 261	2/3							LA—3
	±0.1							
A 264	2/3							LA
	±0.1							
A 275	(1)	2/3	4	5	6	7	See table 8	
Abu Salabikh		5.0	15.0	15.0	25.0			

## Ubaid and Pre-Ubaid Periods

Very little information is available with which to elaborate upon Nissen's discussion of ceramic indicators for these periods in *The Uruk Countryside* (Adams and Nissen 1972, pp. 98–99). It will be noted that virtually no new Ubaid sites were located after the survey moved northward and away from the Uruk/Warka area. The one significant exception is site 1604, situated less than 20 kilometers north-northwest of Warka, although it was not reached by the survey until 1975. Apparently this is a single-period site directly comparable to WS–298 and is assignable to the pre-Ubaid and Ubaid I periods (Adams 1975a.)

## Uruk Period

Before turning to a detailed chronological ordering of the collections, it is necessary to describe the typological system that was applied to the late pre- and protohistoric surface materials and to indicate at least the rough chronological categories into which individual types apparently fall. To facilitate recording, a number of ceramic, stone, and metal vessel and tool types were given letter designations at the outset of the 1975 season. Some of these types, such as beveled-rim bowls (AC) and solid-footed goblets (GB) were of known common occurrence

and chronological significance. Others, such as clay sickles (LA) and stone bowls (NA), were known to be common but were regarded as probably having remained in very widespread use over a long span of time. Recording of their frequency was planned as a clue to patterns of regional or functional differentiation more than to chronological sequence, although in the sequel some of them also were found to be of at least supplementary significance for chronological ordering. Still others, such as low, flat-bottomed basins (DA) and triangular shoulder lugs on jars (EE), had served as useful indicators during the Warka survey but occurred too infrequently to be of much service in the area around ancient Adab, Isin, and Nippur farther north.

Once adopted, there were obvious incentives to retain the coding of types consistently throughout the reconnaissance that followed. It gradually became apparent, however, that the normal range of variation of one type (CG) included examples that were only arbitrarily distinguishable from two others (CC, CD); hence this was ultimately dropped. Similarly, four types were added only in time for the concluding weeks of quantitative recording in December 1975 (AG, BB, CB, CE), their utility having gradually become apparent during the course of the main reconnaissance of the previous spring.

It was clear from the outset that the primary objective

TABLE 8 Presence-Absence Tabulation of Probable Uruk and Jemdet Nasr Traits in Nonintensive Collections at Selected Sites

SITE NO.	A) BOWLS A B C D G	B) BOTTLES A B C D	C) JARS A B C D E F G	D) HANDLES A B C D	F) SPOUTS A B C D E	G) PAINT B C	I) APPLIQUE A B C	J) INCISING A B C D E	K) OTHER DEC. A C D E	L) CLAY ARTIFACTS A B C D E F H	M) CHIPPED STONE A B C D E F G	N) GROUND STONE A B C D E F G	O) METAL A B C
020	++		+++	++	++			++	+			+	
022		+	+++		+++	+	+			+			
023			+		+					+			
042	+	+	++	+	+	+	++	++	+	+		+	
048	++		+	+	+	+		++				+	
051	++	++	+	+	+++			++	+		++		
087	++			++	++		++	++	+	+		+	++
109	+		+	++	+++	+	+	+	+		+	++	
110	+	+	+	++	+		++		+	+			
137	+	+	+++	+++	+++	+	++	++	+	+		+	
144	++		+	+++	+		+		+			+	
162	++	++	+	++	++	+	+	+	+			+	+
163	++		+	+++	+++	+	++	++	+			+	
178	++	++	++	+	+	+	++	++	+				
181	++	++	++	++	++	++	+	++	+	+			
185	+	+	+	++			++	++	++	+		+	+
191	+		+	+++	+++		++	++	++	+		+	
193	+		+				+		++			+	
201	++		+	++	+	+		+	+	+		+	
218	+	+	+	++	+	+	+	+	++	++		+	
219	++	+		++		+		++	++	++		+	
230	+	++	+++	+		+	+	++	+	+		+	
236	+	+	+	+++	+++		+	+	+				
262	+	++	+	++	++			+	+			++	
264	++	++	+++	+++	+++		+	++			+		
272	++	++	++	++	++	+	++	++	+			+	+
274	+	++	+	+++	+++	+	++	++	+	+		++	++
276	++	+	+	++	++			+	+	+		+	
282	++	++	+	+++	+++	+		++	+			+	
285	+	+	+	+	++			+	+				+
292	++	+	+++	++	+		+	++	+	+		+	
297	++		+	+	++		+			+		+	
310	+		++	+++	+++	++	+	++	+			+	
312		++		+	+	+						+	
314	+		+	++	+++		+	+	+			+	+
331		++	+	++			++	++	+				
376	+		+	++	+		+	+	+			+	
386	+	+	+	++	++		+++	+	++			+	
460	+	+	+	+	+	++	++	++	+		+		
743	+++	+	++	+	+	+		+	+			+	
765	+	+	++	+	++	+	+		+		+	++	+
939	+		++	+	+		++	+	+		++	++	+
1046	++	+	++	+			++	+				+	
1306	++	+	+				++			+		+	
1394	++		+	++	++		++	+	+	+		+	
1615	++		++	++	+	+	+		+	+	++	++	+
A275	++			+	++		+	+	+	++	++	+	





of quantitative recording would be a better understanding of sites of the Uruk period. Preliminary work in 1968 and 1973, as well as the earlier findings of the Warka survey, had already disclosed that these sites would be numerous. There was every reason to expect, on the basis of previous findings, that the settlement patterns of the period would reflect important shifts over time. Only with a systematic, detailed chronological framework that was generally applicable to surface collections could these shifts in pattern be unambiguously perceived. Moreover, the surface aspect of Uruk sites is one that invites an extensive listing of traits. In striking contrast to the drab uniformity of Jemdet Nasr and Early Dynastic I sites, on which one or two utilitarian categories are endlessly repeated to the virtual exclusion of all other types, most Uruk sites have a vigorous proliferation of types. In the coding of categories that was finally adopted, therefore, the overwhelming majority of types are only (or at least preponderantly) of Uruk date. The exceptions are the following:

Pre-Uruk: HA (all types of Ubaid painted ware)  
Jemdet Nasr: AD, HC; also, at least some of the following:  
Early Dynastic I: AD, EE, EF, GB, GC, KB, KF  
Early Dynastic II/III: (AD), AE, AF, GC, LG

Leaving all but the first of this small group of types for discussion in connection with subsequent periods, brief definitions follow for each of the Uruk types to which a letter code has been assigned. Reference is made to only a few standard sources of illustration and chronological assessment, since exhaustive treatment of distribution and typology would contribute little to placement of the types for dating purposes. Dating spans are provisionally supplied only in the few cases for which, based on more or less adequate bodies of stratigraphic evidence, the available literature indicates a reasonable consensus or explicit disagreements.

#### A Bowls

- AA Large-diameter bowls with thickened rims, usually with external collar or flange (Adams and Nissen 1972, figs. 49:15, 53:16; Johnson 1973, pl. 2f-h; von Haller 1932, Taf. 18A: s-z, a'-f'). Early Uruk.
- AB Proto-beveled-rim bowls, similar in size, shape, and crude, straw-tempered irregularity to type AC, the hallmark of the Late Uruk period, but with a significantly less pronounced bevel or taper (Johnson 1973, pl. 1b). Early Uruk.
- AC Beveled-rim bowls, heavily straw-tempered fabric. Widely noted and described (e.g., Nissen 1970, pp. 132-38), they need little further reference here. The onset of the type is variously attributed to a Middle Uruk phase (Hansen 1965, p. 202) and to the Late Uruk component of a two-part subdivision of the

period (Adams and Nissen 1972, pp. 97-98). The major concentration is in any event coeval with levels VII through IV in the Eanna precinct at Uruk and levels XX through XV in the Inanna Temple at Nippur. A perhaps slightly later date for the general appearance of these bowls at most other sites is suggested later in this appendix.

- AG Thumb-impressed bases of crudely made, straw-tempered cups or small bowls (Johnson 1973, pl. 1f).

#### B Bottles

- BA Narrow-necked bottles with tapering-band or folded-over rims (Hansen 1965, fig. 7; Adams and Nissen 1972, figs. 54:1; 59:34; von Haller 1932, Taf. 18D:a', 19B:n', p'). Middle-Late Uruk.
- BB Same with low outcurling or ledge rims (Adams and Nissen 1972, figs. 44:6, 56:6, 61:13).
- BC Rims of small, slender, pointed-base bottles with sinuous sides. The rim form most commonly associated with this shape is a simple, gently outflaring one (von Haller 1932, Taf. 17D:r; Adams and Nissen 1972, figs. 53:10, 71:3), but surface examples also occur with a more everted rim and one or more sharply edged horizontal ribs. Early Uruk.
- BD Bases of the above. On many sites rims and bases were counted together, and the two types are grouped together in most of the analysis that follows.

#### C Jars

- CA Neckless, "hole-mouthed" jars with thickened rims (Adams and Nissen 1972, figs. 52:8, 53:8, 61:11, 12; Johnson 1973, p. 31).
- CB Low, out-turned thickened jar rims (Adams and Nissen 1972, fig. 43:33, 34, 58:30; Johnson 1973, pl. 3b).
- CC Thin outflaring or outcurling jar rims (Adams and Nissen 1972, figs. 36:36-38, 43:38, 49:7). Early Uruk.
- CD Small globular jars with short vertical or slightly flaring rims. This designation is applied to rim sherds without evidence of handle attachments, but in fact most such jars seem to have been equipped with one or two handles. See particularly handle type EA, also EB. Late Uruk.
- CE Tapering-band or folded-over jar rims (Adams and Nissen 1972, fig. 39:15).
- CF Miniature jars of various shapes, none common enough to justify a separate typological category (Adams and Nissen 1972, figs. 39:12, 42:27, 47:4, 58:23, 62:20, 68:11).
- CG "Simple," vertical to slightly flaring jar rims. Proving to be somewhat of a catchall category in which otherwise quite dissimilar vessel forms were arbitrarily grouped, this was dropped before the conclusion of the survey.

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### D Basins

DA Large, flat-bottomed basins or trays, generally with vertical or slightly flaring sides and occasionally with thickened and/or everted rims. Examples of this were numerous in the region around Uruk, where they occurred fairly regularly with deep interior scoring on Late Uruk sites (Adams and Nissen 1972, p. 100), and they are also reported at Nippur (Hansen 1965, p. 202). However, they proved less useful as a period diagnostic elsewhere. Also common in the Uruk area at about the same period were smaller, flat-bottomed plates with vertical sides, often with crosshatched rims (Adams and Nissen 1972, figs. 37:13, 54:6-7, 56:7, 61:8; von Haller 1932, Taf. 18D:a-c). These were so rare in the Adab-Isin-Nippur area that they were not recorded as a separate type.

### E Handles, Lugs

- EA Strap handles, normally applied singly to globular jars or cups of small to medium size. Rims are low, vertical, or slightly flaring (see type CD), and frequently there are a series of shallow concentric grooves (perhaps the impressions of the teeth of a comb) on the shoulder. A very common Middle and Late Uruk type, probably continuing into Jemdet Nasr (Hansen 1965, p. 207, fig. 6; Adams and Nissen 1972, p. 100, figs. 37:11, 41:16, 21, 44:163b/1, 3, 50:5, 9, 58:26, 27, 68:9, 10; Johnson 1973, pl. 7c, d).
- EB Twisted rope handles, applied singly to approximately the same range of vessel forms as type EA (von Haller 1932, Taf. 18C:p; Hansen 1965, pp. 202, 207; Adams and Nissen 1972, p. 100, figs. 37:9, 41:18, 20, 45:4, 6, 50:8, 58:25, 64:14; Johnson 1973, pls. 7e, 8a). Also Middle and Late Uruk, lasting slightly longer.
- EC Horizontal twisted rope handles or lugs, generally applied in pairs to a variety of jar rims including (but not limited to) those commonly having type EA or EB handles (Adams and Nissen 1972, p. 100, figs. 41:22, 44:163b/4, 45:1, 47:2, 58:28-30; Johnson 1973, pl. 8b). Middle or Late Uruk.
- ED Nose lugs, usually pierced horizontally, applied to the shoulders of a variety of jar shapes. To judge from relatively complete specimens, either two or four were normally attached to each vessel, possibly for suspension (von Haller 1932, Taf. 19D:b; Hansen 1965, figs. 11, 12, 14, 21; Adams and Nissen 1972, figs. 37:4, 38:2, 42:27-28, 47:5, 7, 51:12, 58:23). A long-lived embellishment of limited utility for chronological placement of surface materials, it apparently spans most or all of the Uruk period and continues well into Early Dynastic times.

### F Spouts

- FA Split spouts, placed at rims of bowls and open jars for pouring (Hansen 1965, fig. 3; Adams and Nissen 1972, p. 100; figs. 33:4, 7, 36:30). Early and perhaps Middle Uruk.
- FB Tall, straight spouts, freestanding and generally placed at an angle on the shoulders of jars (von Haller 1932, Tafs. 18A:f, 18C:b', 18D:i; Adams and Nissen 1972, p. 100, figs. 33:5, 36:31, 52:4). Early Uruk.
- FC Short spouts directly attached to low vertical or outflaring jar rims. Apparently two types of somewhat different chronological significance are involved in this single characterization (Adams and Nissen 1972, cf. fig. 30:c, n, and fig. 31), but it is generally difficult to distinguish between them on the basis of fragmentary surface material. One is of unequivocally Early to Middle Uruk date (Adams and Nissen 1972, fig. 49:7, 72:20; von Haller 1932, Taf. 18D:m); the other, equally clearly, is Late Uruk (Hansen 1965, p. 205, fig. 20; Adams and Nissen 1972, fig. 59:33, 36-39). The two could not be consistently separated in this study, but almost all the examples found appeared to belong to the earlier subtype.
- FD Short conical spouts, wide in diameter at their junction with jar shoulders but tapering rapidly to a small orifice (von Haller 1932, Taf. 19B:a; Adams and Nissen 1972, figs. 41:15, 45:1). Apparently a Late Uruk form, this continues at least through Jemdet Nasr times.
- FE Drooping spouts, a common and characteristic late Middle-Late Uruk form (Hansen 1965, p. 204, figs. 17-18; Adams and Nissen 1972, p. 100, fig. 44:6, 54:1, 59:34; Johnson 1973, pl. 6a).
- FF False spouts, lacking an opening through the vessel wall. Roughly contemporary with type FE in the Uruk region and at Nippur (Hansen 1965, p. 204; Adams and Nissen 1972, p. 100), not a single example was found during subsequent survey.
- FG Unclassifiable fragments or variants.

### G Vessel Bases Other Than Those Specified Above

- GA Ring bases, various profiles and sizes. This category was recorded in a frankly speculative attempt to see whether it could be linked with a particular temporal horizon. From surface evidence (see table 9), an Early or perhaps Early-Middle Uruk dating seems most likely.

### H Painted Ware

- HB Uruk painted styles. Most commonly applied to spouted jars, patterns consist of horizontal bands sometimes connected by crosshatching and separated by one or more horizontal bands of triangles or lozenges that are frequently filled in by stippling or

crosshatching. (Adams and Nissen 1972, p. 100, figs. 52:1-3, 6, 71:11, 72:16, 80:43-44). Small fragments are of course difficult or impossible to distinguish unambiguously from earlier or later styles.

*I Appliqued Strips or Ridges*

- IA Horizontal, fingertip-impressed strips, usually one or more placed below large bowl rims or on jar shoulders (von Haller 1932, Taf. 18A:y-z, b'-f'; Adams and Nissen 1972, figs. 33:1, 42:31-32, 49:15, 53:8, 16, 57:15, 16, 21, 72:13, 14; Johnson 1973, pl. 2a, d). Early Uruk.
- IB Roughly contemporary with the preceding, but these horizontal are thinner, shallower, and accented with fingernail or shell impressions (Adams and Nissen 1972, figs. 42:30, 43:37, 44:2; Johnson 1973, pl. 3m). While contrasting at the extremes, types IA and IB often intergrade with one another and hence could not always be recorded separately.
- IC Sinuous applied strips, generally thin and of low relief. Some are fingertip- or fingernail-impressed, as in types IA and IB, but more often these strips are unembellished. Fragmentary surface findings do not permit the larger designs presumably traced out by these curvilinear strips to be discerned in most cases (Adams and Nissen 1972, figs. 33:1, 49:18, 72:17).

*J Incised Decoration*

- JA Crosshatching within triangular borders, generally framed in horizontal bands around jar shoulders (Hansen 1965, p. 205, fig. 21; Adams and Nissen 1972, figs. 47:7-8, 54:11). Late Uruk.
- JB Other crosshatching, mostly also in horizontal bands (von Haller 1932, Tafs. 19D:b, 20A:n'; Adams and Nissen 1972, figs. 49:12, 62:21, 72:14; Johnson 1973, pl. 4b, c). Late Uruk.
- JC Meander pattern, usually consisting of single broad, shallow groove.
- JD A form of decoration applied to globular and other jar shoulders, predominantly of types EA and EB, consisting of a band of parallel grooves or incisions that are cut obliquely by parallel, somewhat more pronounced slashes (Adams and Nissen 1972, fig. 37:9, 41:20, 44:163a3, 50:10, 62:17, 64:14, 68:9). Late Uruk.
- JE Irregular interior scoring on large shallow bowls or basins.

*K Other Surface Decoration*

- KA Reserved slip, a technique in which "the body (or parts of the body) of a vessel is covered with a thin slip which is then partially wiped off so that the body clay shows in a pattern against the darker color of the slip" (Perkins 1949, p. 109). At one time thought

to be characteristic of the early part of the Early Dynastic period, excavations in the Diyala region traced its origins there to at least Jemdet Nasr times. In southern Mesopotamia, however, the technique was in substantial use through much of the Uruk as well as Jemdet Nasr period and seems to have been less extensively employed thereafter (Hansen 1965, pp. 202-3, 207; Adams and Nissen 1972, p. 100, figs. 37:1, 45:1, 49:7, 52:12, 53:7, 59:36, 68:1, 70:2, 77:10, 11). Oblique patterns are the most common, but vertical banding also occurs.

- KC Punctate impressions, perhaps reed-tips, applied to jar exteriors (other than the specific pattern of use mentioned for the Early Dynastic period under type KB).
- KD Roughly combed or raked finish on jar exteriors (Adams and Nissen 1972, figs. 37:5, 50:1, 52:13; Johnson 1973, pl. 4f).
- KE Chevron-rocker impressions, perhaps obtained by advancing the edge of a shell alternately at one end and then the other (Hansen 1965, figs. 1, 2; Adams and Nissen 1972, fig. 41:16). At Eridu these were felt to be assignable to early Uruk (Perkins 1949, p. 103), but elsewhere they apparently continue into Middle and even Late Uruk times (Hansen 1965, p. 201).

*L Other Ceramic Artifacts*

- LA Clay sickles. Originally thought to be a hallmark of the Ubaid period (Lloyd and Safar 1943, p. 155; Adams 1965, p. 127), they were regarded during the Warka survey as an undifferentiated indicator of the Ubaid, Uruk, and Jemdet Nasr periods (Adams and Nissen 1972, pp. 208-9). While some apparently do occur on single-period Jemdet Nasr sites (e.g., 130, 256), surface collections made during the course of this study argue that the Early and Middle Uruk subperiods (as well as perhaps the Ubaid period) were the time of their most intensive production, and that by Late Uruk times their use was apparently diminishing rapidly.
- LB Celts or axes, usually found with badly battered edges and hence apparently serving a utilitarian end in spite of the relatively soft material. Perhaps they would serve for cutting down *shok*, camel thorn, and other leguminous shrubs for fuel?
- LC Cones, frequently with pigmented and/or indented heads, for use in wall mosaics of public buildings (Adams and Nissen 1972, p. 211).
- LD Hammers, with splayed ends and a generally rather slender shaft hole. Like celts, these are usually found in battered condition and in small fragments. A utilitarian purpose seems likely but remains obscure (Adams and Nissen 1972, p. 213).

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- LE Net weights of various shapes (Adams and Nissen 1972, p. 213).
- LF Spindle whorls (Adams and Nissen 1972, p. 212).
- LH Kiln debris. A record was kept of the distribution of pottery kiln wasters in order to trace the extent of producing activity in various periods. Where kiln wasters can be identified as fused clumps of sickles or badly deformed vessels of one of the types classified above, this is indicated in table 9. Not in Warka survey, nor generally noted except in intensive collections.

### M *Chipped Stone Tools*

- MA Bifacially worked flint or chert axes, celts, or hoes, generally in the shape of an elongated trapezoid.
- MB Small (although characteristically not microlithic) flint blades and rectangular blade sections.
- MC Small, rectangular flint blade sections with denticular retouching along one or both edges.
- MD Prepared flint blade cores, always having been used until blades of adequate size could no longer be struck from them.
- ME Small obsidian blades or rectangular blade sections (rarely noted in Warka survey).

### N *Ground Stone Utensils*

- NA Stone vessels, more often shallow rectangular plates than deeper bowls. The skilled craftsmanship and complex forms that were common around Uruk during the Late Uruk period, even on smaller sites (Adams and Nissen 1972, pp. 206–8), were never in evidence in the region farther north.
- NB Mace-heads (Adams and Nissen 1972, p. 211).
- NC Large crude, pierced, doughnut-shaped “digging stick” weights.
- ND Mortar or metate fragments.
- NE Small cubes with rounded edges, 5 centimeters or less on a side.
- NF Hourglass-shaped weights, crudely shaped of porous white stone.
- NG Axes/celts.

### O *Copper or Bronze Utensils*

- OA “Tool” fragments; rods of circular or rectangular cross section, sometimes tapering.
- OB “Vessel” fragments; sheet or plate, generally curved.
- OC Small, unclassifiable metal objects.

The foregoing listing is in some respects a concatenation of dissimilar units of observation, not all of them necessarily of any chronological significance. A number of whole vessel types are included, distinctive not only in basic form and size, but often in associated appendages and modes of surface treatment. Not a few of the latter also have been listed as independent types, since they are

not confined to one vessel category but can occur on several. Particularly the stone and metal classifications contain tool types that tend to be more functionally than stylistically defined. The adoption and spread of these types conceivably may be more cumulative, an index to broad, long-range patterns of technological or economic achievement and activity, in comparison with the presumably more abrupt cycles of popularity of stylistically variable but functionally equivalent pots. And finally there are residual categories, lumping undefinable fragments and minor stylistic variants to provide no more than a slight extension of our knowledge of the distribution of, for example, jar spouts or metallurgical products. Yet also contained in this list are a number of reasonably consistent and reliable indicators with which to assign individual sites to one or more of a sequence of Uruk subperiods.

The traits in question are those used as ordering criteria in table 10, drawn from quantitatively recorded Uruk collections that are shown in table 9. In most cases their chronological sensitivity has been previously established, although the declining frequency of clay sickles (type LA)—on some Early Uruk sites more common than all other recognizable types added together—does not appear to have been noted previously. Typologically, the transition from Early Uruk to Late Uruk times can be viewed in this region as involving the decline or disappearance of two vessel categories in addition to clay sickles: large diameter, thick-walled, thickened or flange-rim bowls (type AA), frequently with applied, notched or impressed strips (types IA and IB); and small-diameter, pointed-base bottles (types BC and BD). It may also be viewed as involving the introduction and substantial rise in popularity of more globular bottles with different rim profiles (types BA and BB), small globular jars with strap or twisted-rope handles (types CD, EA, and EB), and the crudely made beveled-rim bowls that are sometimes regarded as the most ubiquitous diagnostic criterion for the Uruk period as a whole. Simultaneously, there is a tendency for certain types of bowl and jar spouts (types FA and FB) to be more or less completely replaced by others (types FD and FE). Using these diagnostics, as table 10 indicates, an unambiguous assignment of a majority of the intensive collections to either Early or Late Uruk subperiods can be readily accomplished.

However, this procedure leaves a substantial residual category of sites that cannot be so easily or unambiguously dated. Included in it must be some sites occupied—or periodically reoccupied—during varying proportions of both the Early and the Late subperiods. In other cases difficulties of assignment may arise from unnoticed features of ancient intra- or intersite specialization. But in still others it is reasonable to expect that the collections reflect “single period” sites that were occupied during a transitional or full-fledged Middle Uruk subperiod.

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TABLE 10 Provisional Grouping of Intensive Collections at Uruk Period Sites by Chronological Subperiod, Based on Ceramic Indicators Most Clearly Reflecting Change in Frequency.

SITES GROUPED BY SUB-PERIOD, IN NUMERICAL ORDER		SITE AREA (HA.)	TOTAL URUK SHERD NOS.	EARLIER URUK TYPES					LATER URUK TYPES					
				AA	BC+ BD	FA+ FB	IA+ IB	LA	AC	BA+ BB	CD	EA	EB+ EC	FD+ FE
PRIMARYLY EARLY URUK	118	5.3	93	8		*	4	73						
	792	6.8	101	11	6	2	15	43	*				*	
	804	1.7	124	15	4		14	78						
	837	1.4	118	16	5	2	7	78						
	1118	0.6	120	3	2		2	72		1				
	1124	6.8	147	11	7	*	9	101	*	1			*	
	1159	4.5	51	6	*	1	5	27						
	1198	3.4	90	10	1		11	51				1		
	1416	0.6	75	21	1		18	20						
	TOTALS:		919	101	26	5	85	543	*	2		1	*	
	PERCENT:			11.0	2.8	0.5	9.2	59.1		0.2		0.1		
MIDDLE, EARLY - MIDDLE - LATE OR INDETERMINATE URUK	128	1.8	144	2		1		75	11		*	1	4	
	245	6.0	135	2	1	3	11	34	10	*	4	1	1	*
	573	1.0	86	2		3	4	38	*		*		1	
	790	5.5	94	10		2	1	20	4	2	6	1	*	*
	940-#1	1.7	112	3	*	1	2	59	1		*	*	*	
	975	5.8	61	3		*	2	39	*	2			*	
	1020	8.2	247	20	11	2	12	114	1	12	*	*	*	
	1072	3.4	279	6	*		11	84	114	4		5		1
	1137	3.8	136	8	5	1	4	67	14			2	*	1
	1164	1.0	19	1	*			11	1					1
	1172	25.5	165	19	*		5	100	11			1	*	
	1194	11.5	33	6	1	1		2	4	1				
	1205	7.9	192	18	2	*	4	120	4				2	*
	1312	0.2	78	7	1		6	45	1			1	4	1
	1375	0.2	38	2		2	1	15	4			1		
	1432	1.7	67	2	1	1	*	27	7	1	2	2		*
	TOTALS:		1886	111	22	17	63	850	187	22	12	15	12	4
	PERCENT:			5.9	1.2	0.9	3.3	45.1	9.9	1.2	0.6	0.8	0.6	0.2
PRIMARYLY LATE URUK	125	24.0	72	1		1	1	*	9	3	8		3	1
	126	4.0	68	*			1	14	5		8		2	
	574	1.0	73	3		*	2	10	16	2		4		*
	805	0.5	61	1		1		11	23	1	4	3	6	3
	940-#2	1.7	33					6	14		*	1	2	
	1154	2.6	39	1	*			1	33				*	
	1163	0.9	78					2	52	2	3		6	
	1165	5.3	70				*	*	36	1	6		3	4
	1216	4.8	45				3	5	10	2	2	2	1	
	1261	0.8	83	1		*	2	38	17	1		5	3	1
	1315	2.8	49	1	4		1	9	11	1		2	3	*
	1448	0.9	136				9	39	6	1	2	1	13	10
	TOTALS:		807	8	4	2	19	135	232	14	33	24	42	19
	PERCENT:			0.9	0.5	0.2	2.4	16.7	28.7	1.7	4.1	3.0	5.2	2.4

\* Rare sherds of this type noted elsewhere than in area(s) of intensive collection.

Working with surface collections of the Uruk period from southwestern Iran, Johnson has developed a strong if still not wholly convincing case for the existence of an identifiable Middle Uruk subperiod. What makes his views especially pertinent is that they are based on material that not only is typologically very similar but was more extensively and systematically recorded than was possible here. He summarizes the grounds for his judgment while candidly acknowledging ambiguities that have not yet been eliminated, in terms possibly applicable to south central Iraq as well to Khuzestan:

the absence of clear phase diagnostics for Middle Uruk

renders identification of Middle Uruk occupations from surface collections a problematic issue. Our experience indicates, however, that Late and Early assemblages contain a sufficient number of phase diagnostics that their absence from an Uruk surface collection of reasonable size is a reliable indicator of the presence of a Middle Uruk occupation. Middle Uruk contains a sufficient number of types not present in Early to allow identification of an Early-Middle occupation (in the absence of Late Uruk diagnostics). A more serious problem is posed by the close similarity of much of the Middle and Late Uruk assemblages. Thus it may be difficult to distinguish a site with Middle and Late occupations from a site with a Late occupation only. [Johnson 1976, p. 204]

It remains to be seen how useful it is to define a temporal unit on this fairly tenuous basis—although in some respects the basis for the widely accepted Jemdet Nasr period is not very different. Insofar as we deal with surface collections rather than stratigraphic excavations, we must remain conscious of unstated assumptions about occupations falling conveniently into “Early-Middle-Late” blocks rather than generally being confused by repeated reoccupations and abandonments. But a Middle Uruk category is satisfying to good trinitarian principles and certainly is not an unreasonable chronological refinement toward which to work. While the field data available from this study in general do not permit its recognition even with the qualifications that Johnson describes, I have employed the term provisionally as an admittedly mixed and somewhat amorphous grouping of sites for which more definitive criteria cannot yet be assigned.

Concern for chronological subdivisions is obviously important if we are to understand the dynamics of settlement change within the Uruk period. Even a partial and provisional assignment of individual sites to one or more of these categories contributes to the identification of sequent patterns of distribution and shifts in size and density. But the variation in individual collections that is suppressed by any system of categories is itself significant for cultural understandings of a different order. Within the framework of a discussion focusing principally upon chronology, let us consider a supplemental method of ordering the collections that highlights variation and seeks to test its relationship to successive chronological intervals.

The Uruk period was a time when certain artifacts entered into genuine mass production, even if the producing units in many cases seem to have been small handfuls of kilns in numerous individual settlements of all sizes rather than large, centralized workshops. The unprecedented concentration on a few seemingly utilitarian types gives every appearance of being a sociological as well as a stylistic fact, a decisive shift in behavior patterns that indicates an alteration in the traditional framework of social relationships governing production, distribution, and consumption. Although we are only dimly aware of what the shift may have entailed, the development of mass production deserves to be treated on a different plane from a mere succession of stylistic shifts. It is at least arguable that the onset of this new pattern was a cumulative process that ramified widely into the social organization of towns and villages of the time and was in this sense quite distinct from the waxing and waning of traditional styles through atomistic individual decision-making. At any rate, this interpretation suggests a rank ordering of the collections on the basis of certain frequencies of occurrence as a means of assessing the uniformity of incidence and spread of some of the most common, widely circulated items.

Clay sickles and beveled-rim bowls are the two most useful cases, at least within the framework of types employed in this study. As already noted, the former reached an apparent peak of popularity in Early Uruk times and thereafter declined, whereas the latter were essentially absent in Early Uruk times but subsequently became very popular. Table 11 rank orders collections on the basis of the frequency of these traits, providing in addition certain other chronological information. How does it complement or modify the chronological ordering given earlier?

Several pertinent observations may be made with regard to the distribution of clay sickles. First, it seems clear that a substantial, continued decline in the frequency of sickles began during or immediately after the early phase of the Uruk period. At eight of the nine sites attributable primarily to that phase, sickles constituted from 42.6 to 78.5 percent of all identifiable Uruk sherds, and the lower frequency at the ninth (1416) is surely due to special limitations on collecting procedures that were necessitated there by an overburden of post-Uruk debris. Uruk collections at the twelve sites of primarily Late Uruk date, on the other hand, ranged in sickle frequency from 0 to 45.8 percent, with only one of them rising above 29 percent. It must be added, however, that actual production of sickles—as distinguished from mere use and discard—seems to have continued until at least the end of the Uruk period if not later (cf. Adams and Nissen 1972, p. 208). This is confirmed by the presence of sickle kiln wasters at a site like 1163 where there is essentially no evidence of an Early or even Middle Uruk occupation.

It can also be observed that sickle production and discard is not linked in any close or persuasive way with site size. One might have hypothesized, for example, that sickle production was concentrated in the larger settlements and that the smaller ones were merely subsistence-oriented villages. However, this seems not to be the case. Kiln wasters of sickles were found at only one of the four Early Uruk sites larger than 4 hectares, but at three of the five smaller ones. Similarly, there is nothing to suggest that the frequency of ordinary sickle fragments was inversely correlated with Early Uruk site size.

Overshadowing these particulars of sickle distribution is a remarkably common feature: their overwhelming frequency. They constitute more than three-fifths of all identifiable Uruk sherds from all the Early Uruk sites considered as a group, and more than 45 percent even at sites assigned to the Middle Uruk phase. To be sure, many body sherds from a broken pot may not be assignable to one of the above categories, whereas virtually all sickle fragments are immediately recognizable as such. But the profusion is still noteworthy and should be kept in mind, even though no obvious explanation is available. Granting their fragility in the face of hard use, what accounts for the presence of such vast numbers of these implements

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TABLE 11 Rank Orderings of Uruk Sites in Terms of Typological-Chronological Criteria Listed in Table 10

DECREASING RATIO OF TYPES PRESENT: EARLY/LATE URUK			DECREASING EARLY PROPORTION OF TOTAL URUK SHERDS			INCREASING LATE PROPORTION OF TOTAL URUK SHERDS			DECREASING PROPORTION OF CLAY SICKLES (TYPE LA)			INCREASING PROPORTION OF BEV.-RIM BOWLS (TYPE AC)				
SITE NO.	CHRON. CLASS.	RATIO	SITE NO.	CHRON. CLASS.	%	SITE NO.	CHRON. CLASS.	%	SITE NO.	CHRON. CLASS.	%	LOCAL MFG (KILN WASTERS)	SITE NO.	CHRON. CLASS.	%	LOCAL MFG (KILN WASTERS)
837	Early	5/0	837	Early	91.5	118	Early	0	118	Early	78.5		118	Early	0	
118	Early	4/0	118	Early	91.4	804	Early	0	1124	Early	68.7	X	804	Early	0	
804	Early	4/0	804	Early	89.5	837	Early	0	837	Early	66.1		837	Early	0	
1159	Early	4/0	1124	Early	87.1	1159	Early	0	975	Middle	63.9	X	1118	Early	0	
1416	Early	4/0	1198	Early	81.1	1416	Early	0	804	Early	62.9	X	1159	Early	0	
1118	Early	4/1	1416	Early	80.0	792	Early	0*	1205	Middle	62.5	X	1198	Early	0	
1198	Early	4/1	1159	Early	76.5	1124	Early	0.7	1172	Middle	60.6	X	1416	Early	0	
792	Early	5/2	792	Early	76.2	1118	Early	0.8	1118	Early	60.0	X	573	Middle	0*	
1194	Middle	4/2	1312	Middle	75.6	940-#1	Middle	0.9	1164	Middle	57.9	X	792	Early	0*	
1375	Middle	4/2	1172	Middle	75.2	1198	Early	1.1	1312	Middle	57.7	X	975	Middle	0*	X
1124	Early	5/3	1205	Middle	75.0	573	Middle	1.2	1198	Early	56.7	X	1124	Early	0*	
1172	Middle	5/3	975	Middle	72.1	1205	Middle	3.1	1159	Early	52.9		1020	Middle	0.4	
1205	Middle	5/3	1118	Early	65.8	975	Middle	3.3	940-#1	Middle	52.7	X	940-#1	Middle	0.9	
1154	Late	3/2	1020	Middle	64.4	1020	Middle	5.3	128	Middle	52.1		1312	Middle	1.3	
1164	Middle	3/2	1164	Middle	63.2	1172	Middle	7.3	1137	Middle	49.3	X	1205	Middle	2.1	
573	Middle	4/3	1137	Middle	62.5	1312	Middle	9.0	1020	Middle	46.2	X	790	Middle	4.3	
975	Middle	4/3	940-#1	Middle	58.0	1164	Middle	10.6	1261	Late	45.8		1448	Middle	4.4	
1312	Middle	4/3	573	Middle	54.7	128	Middle	11.1	573	Middle	44.2	X	1164	Middle	5.3	
940-#1	Middle	5/4	128	Middle	54.2	245	Middle	11.9	792	Early	42.6		1172	Middle	6.7	
1137	Middle	5/4	1375	Middle	52.6	1137	Middle	12.5	1432	Middle	40.3		126	Late	7.4	
1020	Middle	5/5	1261	Late	49.4	1375	Middle	13.2	1375	Middle	39.5		245	Middle	7.4	
1432	Middle	5/5	1432	Middle	46.3	790	Middle	13.8	1072	Middle	30.1	X	128	Middle	7.6	
574	Late	4/4	245	Middle	37.8	1194	Middle	15.2	1448	Late	28.7		1137	Middle	10.3	
1072	Middle	4/4	1072	Middle	36.2	1432	Middle	17.9	1416	Early	26.7		1432	Middle	10.4	
245	Middle	5/6	1448	Late	35.3	1448	Late	24.3	245	Middle	25.2		1375	Middle	10.6	
1261	Late	4/5	790	Middle	35.1	574	Late	30.1	790	Middle	21.3	X	1194	Middle	12.1	X
1315	Late	4/5	1315	Late	30.6	126	Late	30.9	126	Late	20.6		125	Late	12.5	
126	Late	3/4	1194	Middle	30.3	1261	Late	32.5	1315	Late	18.4		1261	Late	20.5	
128	Middle	3/4	126	Late	22.1	125	Late	33.3	940-#2	Late	18.2		574	Late	21.9	
125	Late	4/6	805	Late	21.3	1315	Late	34.7	805	Late	18.0	X	1216	Late	22.2	X
790	Middle	4/6	574	Late	20.6	1216	Late	37.8	574	Late	13.7	X	1315	Late	22.4	
805	Late	3/6	940-#2	Late	18.2	1072	Late	44.4	1216	Late	11.1		805	Late	37.7	X
1165	Late	2/5	1216	Late	17.8	940-#2	Late	51.5	1194	Middle	6.1		1072	Middle	40.9	X
1216	Late	2/5	1154	Late	5.1	805	Late	63.9	1163	Late	2.6	X	940-#2	Late	42.4	
1448	Late	2/6	125	Late	4.2	1165	Late	71.4	1154	Late	2.6		1165	Late	51.4	
940-#2	Late	1/4	1163	Late	2.6	1163	Late	80.8	1165	Late	0*		1163	Late	66.7	
1163	Late	1/4	1165	Late	0*	1154	Late	84.6	125	Late	0*		1154	Late	84.6	

\* Rare sherds of this type or types noted outside area(s) of intensive collection.

in occupational debris rather than in the surrounding fields for which they were presumably destined? It appears that they must have been supplementarily employed within the settlements. The conversion of low desert brush to some more condensed form of fuel is a modern household task for which they would have been at least marginally suitable.

Turning to beveled-rim bowls, tables 10 and 11 establish that their rise in frequency more or less paralleled the decline of the sickles. Examples are extremely rare on the group of Early Uruk sites and hence perhaps suspect as later strays. The Middle Uruk group—emphasizing once more that this may not be a chronologically well-defined phase—ranges from equally rare occurrences up to frequencies of 10 to 12 percent (the much higher frequency at site 1072 is due to one of the three intensive collections there having been made in an area of exceptional, highly localized concentration around an apparent kiln). Late Uruk frequencies of beveled-rim bowls can be almost as

overwhelming as was the case with sickles during the Early Uruk period, although the median is only 22.3 percent and the variance is greater. The significance of the greater variance is that beveled-rim bowl frequencies probably reflect more clustered patterns of manufacture, use or discard than those of sickles. Hence the general chronological trend toward increased use may often be masked by localized variables that are not yet well understood.<sup>11</sup> Suggestions that beveled-rim bowls were standardized measures functioning in connection with a ration system, most systematically advanced by Johnson (1973, pp. 129–39), find little support in the distributions recorded in tables 10 and 11. Rationing carries a presumption of specialization and of a differential concentration on larger sites where agricultural surpluses were more likely to be stored and administrative specialists were more likely to congregate. Yet in these data beveled-rim-bowl frequencies are if anything negatively correlated with site size. Only two of the eleven Middle and Late

Uruk sites of more than 4 hectares have Uruk ceramic industries in which beveled-rim-bowl frequencies are higher than 12.5 percent, while eight of the seventeen remaining, smaller sites have frequencies of 20.5 percent or higher. Manufacture, to be sure, may be marginally more concentrated. Kiln wasters of beveled-rim bowls were found on three of the larger sites but only two of the smaller ones. That was clearly the case in Uruk, where Nissen reports 60 to 79 percent frequencies in occupation levels (1970, pp. 129–31).

It must be kept in mind, of course, that the entire foregoing discussion rests upon distributions of surface materials rather than on excavated, stratigraphically secure samples. The possibility of subsequent disturbance can never be entirely excluded. It is only a matter of conjecture, moreover, what the depth and character of overlying debris may have been that provided a matrix for the present assemblages of surface artifacts before it was scoured away by various erosive processes. Still, the results of this analysis are closely congruent with what is known from reasonably secure and well-documented Uruk stratigraphic sequences. If future excavations or more refined surveys indicate the need for corrections in this framework, we can at least hope that the data in table 9 will provide a basis for refining the site chronology as it is summarized in table 7.

There may be need also to reiterate a second caveat or qualification. As I suggested earlier, a variety of sequences of occupation at individual sites could account for similar type frequencies among the surface materials. Differences in duration, periodic changes in size or concentration, and even intervals of temporary abandonment all may lie behind sites whose surface aspect is very uniform. Individual settlement histories almost certainly were complex and not at all uniform, and the presentation of rank orderings like those given in table 11 should not be taken to imply that the demographic history of the region as a whole can be conceptualized as an orderly sequence of “single-period” occupations arranged along a continuum from Early to Late. To test the extent of variability in occupational sequences, as well as to advance our understanding of the Uruk period in almost any other way, we must await an opportunity to examine considerable numbers of both smaller and larger Uruk sites with programs of stratigraphic testing and perhaps large-scale excavation as well.

Finally, the Uruk chronology that emerges from this analysis should be regarded not merely as a somewhat provisional sequence but as a strictly relative one. The tripartite divisions within it are not clearly established, although the considerable contrasts between the two halves of an alternative bipartite division make this further refinement plausible. Additionally, the numbers of sites falling into the various divisions of the sequence imply very little about the duration of those divisions. Depths of

occupational debris observed in excavations can also be a misleading guide to duration of settlement, but in most cases they are a far better index to chronology than what can be offered here. To take the giant next step, once again, we must await a substantial program of excavations directed toward the long list of promising candidates identified in the site catalog. But during the unknown and surely considerable interval until that is possible, this discussion has proceeded on the conviction that it is better to light a small candle than to curse the darkness.

### *Jemdet Nasr Period*

As was pointed out at the time of the Warka survey (Adams and Nissen 1972, pp. 100–103), diagnostic criteria for the Jemdet Nasr period are extremely difficult to characterize without ambiguity. Perhaps because of its apparent brevity, surface collections from sites occupied during the period have very few distinguishing features.

Conical cups (type AD), produced crudely but in great profusion, are in every respect the dominant feature. There may be little difficulty with their origins, since they appear to replace beveled-rim bowls more or less abruptly in a shift that is equated here with the Uruk–Jemdet Nasr transition. Similar, continuously intergrading forms seemingly continue for the greater part of the succeeding Early Dynastic period, however, so that a site abandoned after Jemdet Nasr times often can be distinguished from one that continued only by the presence of conical cups and the simultaneous absence of characteristic Early Dynastic I forms like solid-footed goblets (type GB).

Perhaps the only specific features are certain styles of boldly linear painted decoration in red, black, or purple (HC) that are typically applied to the upper surfaces of large jars. But these, unfortunately, do not occur frequently enough for their absence at any particular site to provide a conclusive indication that it was not occupied during the Jemdet Nasr period. Hence a large proportion of sites that are cataloged in table 7 as probably having been occupied during the Jemdet Nasr period can be shown only parenthetically, implying a considerable element of doubt about their existence, not to speak of their extent, at this period.

Perusal of finds cataloged in table 7, both from single-period Jemdet Nasr settlements and from others in which Early Dynastic I remains also were present but could be distinguished because their distribution was obviously localized, permits a number of additions to be made to the above-mentioned two types. While they also occur on Late Uruk sites as indicated earlier, the following traits apparently continue into or even through the Jemdet Nasr period: bottles (with folded-over or ledge rims (BA, BB), which are attested also in Jemdet Nasr levels at Nippur (Hansen 1965, p. 207); miniature jars (CF); strap and twisted-rope handles for globular jars (EA, EB), again



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lasting into Jemdet Nasr levels at Nippur, nose lugs on jar shoulders (ED), conical spouts (FD), reserved-slip ware (KA), clay sickles (LA) in severely declining numbers, clay cones for mosaic wall decorations (LC), and stone bowls (NA).

### *Early Dynastic I Period*

While it remains “orthodox” to consider the Early Dynastic period a cohesive phase of archaeological development, the attainment by Uruk of its maximal urban size in the Early Dynastic I period has led in this chapter to a scheme of periodization concluding only after that time. However, there are at least some additional considerations of a more traditional kind that lend support to the alternative division followed here. As Crawford has noted on the basis of architectural as well as ceramic criteria, “it is becoming increasingly clear that there is a strong case for a continuous development from the Jemdet Nasr phase into Early Dynastic I.” Moreover, Early Dynastic II, at one time “merely an awkward transition between Early Dynastic I and Early Dynastic III,” has increasingly taken on developmental as well as archaeological characteristics of its own (Crawford 1977, p. 9).

Diagnostic criteria used throughout this study remain essentially as they were in the Warka survey (Adams and Nissen 1972, p. 103). Conical cups (AD) continued in heavy use, but they were supplemented by the mass production of taller conical goblets or chalices with a low, solid foot that took the form of a truncated cone. As sloppily made as the conical cups, these goblets are generally somewhat irregular in shape and often have slumped during the firing process. Hence it is unlikely that the feet, in any case of very modest size in proportion to height, could have been intended as supports that would normally permit the goblets to stand on a flat surface. At least at Nippur this type seems to have been of very brief duration in spite of its popularity, for it is noticeably more frequent in the middle than in the earlier or late levels associated with the period (Hansen 1965, p. 209).

Other dating criteria, much less frequently found than the former two, include: a vertical lug handle placed on

jar shoulders, taking the form of a triangular slab (EE), apparently the forerunner of the later, so-called goddess handles (Adams and Nissen 1972, p. 103, fig. 74: 10); tabs or short ledge handles placed at intervals (normally four to a jar?) around low vertical or slightly flaring jar rims (EF), “characteristic of Early Dynastic I” at Nippur (Hansen 1965, p. 208); curved upper surfaces of jars with reserved-slip decoration (usually in a continuous oblique pattern) and a line of punctate impressions at the junction between the shoulder and the neck of the jar (KB); and “cut ware” (KF), tall vessels, stands, or pedestals with groups of triangular or circular excisions and often also with incised crosshatching, notched horizontal ridges, and other forms of surface decoration. So-called fruit stands (GC)—tall, inward-sloping pedestals, accented with (frequently notched) horizontal ridges, that presumably supported open bowls—were thought at the time of the Warka survey to date only from the later Early Dynastic period. To judge from surface materials, however, some examples must go back at least into Early Dynastic I times. It will be noted in Appendix B that there are several examples on Jemdet Nasr sites with no other recognizable Early Dynastic material at all, so that the beginning of the use of these stands may be even slightly older. Other traits that continue onward from Jemdet Nasr times include nose lugs on jar shoulders (ED); spouts of various form, mostly easily distinguishable from earlier ones (classified as type FG, a residual, indeterminate category); and reserved slip ware (KA). If stone bowls (NA) continued in use at all—remembering that we are concerned with primarily secular use in generally small, outlying settlements, not with their manufacture for temple service or urban elites in the major centers—it appears to have been on a scale that was at best very small and questionable. Clay sickles (LA), similarly, surely all but disappeared from general use by this time. Probably the rare examples that do occur in Early Dynastic levels are better interpreted as strays brought up from underlying levels by various forms of later disturbance rather than as objects of contemporary use or manufacture.

## A P P E N D I X B

### A GROWTH-SIMULATION PROGRAM

*Robert G. Hassert*

#### *Technical Aspects*

The program used to generate the maps in figure 23, 24, 25, and 36 was written in FORTRAN and was run on the University of Chicago's IBM 370/168. The pro-

gram itself consists of only 164 lines of code, but it requires an additional 226K bytes of memory, mostly for forming the entire map image in a large two-dimensional array. Thus the program requires either a sub-

stantial core memory or an efficient paging environment—both of which were available on our machine. The generation of the largest map, which included 645 sites, took just under three and one-half minutes of CPU time. This could probably be reduced somewhat by using a more efficient compiler than the University of Waterloo's WATFIV.

### *The Problem*

The problem we set out to solve with this program was a very specific one—what was the probable configuration of cultivated land during various periods of ancient Mesopotamian history, based on the estimated population at all known sites in each period. In fact, however, the program is applicable to a variety of related problems—for example, the growth and encounter of cell cultures in a Petrie dish, or the spread of competing plant species in a homogeneous environment. The key element in all of these situations is the steady expansion of a population from a point source, an expansion that takes the form of a circle whose radius gradually increases until it encounters some obstacle. When the advance is blocked in any direction it continues in whatever direction is open until the total area occupied reaches some limit (in the present simulation, the amount of agricultural territory needed to support the population of the city at its center).

### *The Algorithm*

The present program is a simulation. It attempts to arrive at the results of the growth process by replicating that process, as described below.

First, the data for each site—horizontal and vertical map coordinates and estimated population—were read into the program. These data were then sorted by the estimated population size.

A scale of 1:100,000 was chosen for the finished map. The site coordinates and distances were scaled to the map size and converted to print positions. The large scale was chosen because each print position measures 0.1 inch (0.254 cm) horizontally by 0.125 inch (0.3175 cm) vertically, and in order to achieve the necessary detail with so coarse a grid size we had to print a very large map—500 print positions vertically by 430 horizontally. This translates into a map 43 inches across by 62.5 inches from top to bottom—a size that required printing the map in four separate vertical strips to be joined by hand. The resolution in real dimensions, therefore, is approximately 317.5 meters vertically and 254 meters horizontally; each print position represents an area of slightly more than 8.06 hectares.

A print value (a single letter or numeral) was assigned to each site. Territory belonging to that site would be filled in with that character.

The main part of the program filled in the territory

for each site by circling around each site in turn, looking for unoccupied space. As the program found free territory, it assigned it to the site it was examining, one print position (8.06 hectares) at a time, and subtracted that amount from the total remaining area required by that site. When all the territory around a given site had been occupied out to a particular radius, the program went to the next site; when all sites had been considered at that radius, the program increased the radius and repeated the whole process for all sites that still required territory.

If we could watch the assignment of territory as it actually took place in the computer's memory, it would look like this: each settlement is marked as a point on the map; all these points begin to expand simultaneously, at the same rate, forming gradually expanding circles of territory; the smaller sites, and those with no near neighbors, soon reach the limit of their territorial needs with no interference and stop expanding; other sites, however, continue to grow and their territories collide; when this happens, each such site ceases to grow where it abuts occupied territory, but it continues to expand at the same rate in other directions, still forming a circular arc whose center is the settlement to which the territory belongs. If a site is completely surrounded, it continues to search for open land beyond its borders, leapfrogging over the occupied areas enclosing it. Only when the full territorial needs of each site have been met is the map complete.

One of the technical problems involved in this search procedure was the choice of the radius increment and angle increment. As the program searches for unoccupied cells at a given radius from a site, it must circle the site in small jumps whose size is determined by the angle increment. If the jumps are too large, some available cells might be missed; if the jumps are too small, the same cell might be examined several times, resulting in slower and less efficient execution of the program. The same holds true of the radius increment, which determines the new search radius once all cells have been filled within the current radius. After some experimentation we determined that workable values were a radius increment of 0.085 inch (slightly less than the finest resolution of the map, the 0.1 inch horizontal spacing) and an angle increment calculated as  $\text{ARCSIN}(0.8/\text{RADIUS})$  (the jumps, and therefore the angle increment, must decrease in size as the radius increases). Each time the radius is increased, a new angle increment is calculated. These values left no holes in the coverage of the occupied areas and caused each cell to be examined 1.8 times, on the average; this is probably close to the theoretical optimum.

The final steps in the creation of the map were the addition of distinctive signs to mark the location of each site and others at the vertexes of the boundaries of the survey area. The finished map was then stored on a disk memory unit, from which it could be retrieved and examined at a terminal or printed on a high-speed printer.

### *The Results*

Two of the major assumptions that underlie this simulation—that all sites begin at zero territory and that all expand at the same rate—are patently suspect, and this should caution us against injudicious attempts to analyze the configurations of individual territories. Nevertheless, the appearance of the finished maps is probably a fairly accurate reflection of agricultural requirements at the height of the periods they represent.

The program could be modified to remove those

assumptions. For example, we might begin with the territorial configuration of one period and expand (or contract) the territories on the basis of data from the succeeding period. Similarly, we might have individual territories expand not at the same rate, but at a rate proportional to their size. These approaches would, of course, involve their own assumptions.

Researchers are invited to use or adapt the program presented here for their own purposes. We hope that it will prove a stimulating tool for further experimentation.

# 4

## Integration and Fragmentation under Successive, Contending Dynasties (*Early Dynastic II–Middle Babylonian Periods*)

Uruk's attainment of maximum size toward the end of the Early Dynastic I period signaled the end of a cumulative process of growth and change. Within less than a millennium an extensive, potentially fertile plain with only small isolated pockets of permanent settlement had been unevenly but permanently and in some cases densely occupied. Urban centers had appeared throughout the region, attracting their new inhabitants from surrounding towns and villages through what was probably a complex, continuing series of smaller-scale multidirectional movements. Superimposed upon the general process of expansion in numbers and localized concentration in and around urban centers, however, was a major internal shift of population toward the south and southeast.

Growth, in other words, was neither universal nor uniform. Some important towns had not only flourished but been abandoned, and the increasing predominance of cities was everywhere accomplished at the cost of an accelerating abandonment of the countryside. But in trends of settlement, just as in a host of institutional innovations and cultural accomplishments, the sense of cumulative development in societal scale and complexity outweighs the deep and surely somewhat disruptive flux that accompanied it.

No similar accumulative trends characterize the two millennia that follow. There is ample textual evidence for the periodic emergence upon the scene of new ethnic and linguistic elements. But the settlement record, divided into fairly gross intervals of three centuries or so, is not easy to correlate with geographically unspecific attestations of new arrivals. Instead, the maps of successive settlement patterns seem to show an ebb and flow of population into and away from outlying regions, expanding and contracting the nuclei of settlement and cultivation in response to fairly transitory political stimuli. Individual urban centers also experienced alternately ris-

ing and falling fortunes, a few of them briefly advancing into the status of political capitals but all more commonly experiencing repeated, often prolonged, interruptions in their power and prosperity. Urban institutions and amenities flickered on in only a handful of the largest and longest-lived among them as the two millennia with which this chapter deals drew to a close.

The alternating conditions of growth and decline, stability and upheaval require detailed analysis in their own right. Awaiting more systematic, securely dated study, for example, are the potentially significant effects of variations in precipitation and river discharge patterns. These could play a part in destabilizing settlements dependent on irrigation, and in addition they might well be responsible for inducing large-scale movements of nomadic or seminomadic elements that at times were capable of gravely disrupting urban life. Apart from climatic change in the strict sense, of course, human activities like deforestation and overgrazing also can exercise a large influence on runoff. However, quite apart from shifts linked to environmental changes, we must recognize that much instability can be essentially social in origin. In any case, all these geographic and demographic, and in an important sense also societal, parameters are at least as crucial to an understanding of the historic record as the "dynasties, wars and religions" on which a far greater proportion of scholarly attention has traditionally been lavished. But it must be conceded at the outset that cyclical shifts as well as other conditions during the two-millennium span of early Mesopotamian history militate against a primarily archaeological study as sequential and systematic as that made in chapter 3 with respect to the late pre- and protohistoric phases.

One particularly adverse change involves a diminution in the quantity and reliability of survey data, a conse-

quence of the increased locational stability of the major centers. Long, multiperiod occupations or reoccupations, or both, became much commoner. Particularly in view of the preponderantly urban character of settlement after late prehistoric times, only a much reduced proportion of the total occupied area during the succeeding periods is represented by either the latest or the sole occupations of settlements recorded in a surface reconnaissance. Accordingly, there is a steep decline in the accuracy—sometimes even in the possibility—of estimates of aggregate as well as individual site areas. The approach consequently taken with respect to the sites dealt with in this chapter, in full acknowledgment of the increased uncertainty, is to deal with their areas only in terms of fairly broad size categories rather than specific size estimates. Unfortunately, this precludes a number of approaches to the data that played an important part in the preceding analysis of the pre- and protohistoric periods, but to convey a spurious impression of precision would be even more unfortunate.

Only with much more elaborate (and time-consuming) survey methods, based on intensive sampling of surface materials from all parts of each site, would reasonably reliable estimates of occupied area during successive periods become feasible. Even then it must be kept in mind that the physical removal of occupational debris and its presumed dispersal over surrounding areas is an ancient practice that is very widely attested, particularly in connection with preparing the foundations of new monumental buildings. It seems quite likely, therefore, that only an extensive program of stratigraphic testing coupled with careful assessments of spans of occupation that are attested in ancient documents (e.g., Jones 1976, pp. 43–44; Stone 1977, fig. 2) can fully repair the deficiencies of surface collecting as a means of estimating site areas for the greater part of the third, second, and first millennia B.C.

Reference to the documentary sources reminds us that the availability of massive numbers of texts completely transforms the character and potentialities of the ancient record. Authorities may differ on the relative potential contributions of archaeological and historical approaches to the subject matter of the fully historical portion of this book, but there is no doubt that heretofore the archaeological contribution has been strictly secondary and ancillary. Work has been focused primarily on large-scale, relatively uncontrolled excavations of public buildings and tombs and has largely eschewed the quantitatively based, interdisciplinary themes of investigation pioneered by the prehistorians to whom no information from texts is available. It is certainly no longer true that Mesopotamian archaeology for the historic ranges of time can be fairly described (as to some extent was the case in the early days) as a mining operation in search of texts. But the dominant strategies of study—the avenues of

investigation followed, the priorities, the questions asked—are still very largely those geared toward narrowly corroborating and supplementing texts as well as maximizing the chances for further textual recovery. The irony is that in the long run such strategies are precisely the wrong ones with which to complement and extend the textual testimony most effectively.

Archaeological survey procedures, for all the unquestionable deficiencies in this particular application of them, represent at least a small step toward rectifying the balance. A grid of comparable findings, more or less systematically obtained, is thrown over prehistoric and historic periods together. Questions become urgent and inescapable that otherwise could be postponed or avoided altogether: What was the changing nature of settlement and land use, not merely in the immediate hinterlands of major cities but in the countryside as a whole? To what extent did the frequently asserted institutional continuity and a textual stream of tradition reflect more general social patterns of flux and continuity? How can we begin to scrutinize the question whether the voluminous recorded attitudes of the literate urban elites are representative of those of the great, silent mass of the population? How do we overcome the constraining effects of successive textual—and specialized philological—genres in order to obtain a comparative and developmental perspective on the whole five-thousand-year sweep of Middle Eastern history?

Here we must undertake to ask some of those questions, however crudely and tentatively. Ideally, this should be done as a substantial, long-continuing, collaborative enterprise in which archaeological findings are continually matched with the judgments of historians and philologists specializing in the whole range of textual corpora from early Sumerian to medieval Arabic. Again, this can only be a very modest beginning, the expression of a hope as to what may one day develop on a vastly firmer footing. The textual sources employed, often uncritically and perhaps mistakenly, are those available in published translations. Large numbers of additional texts still await study and publication in any form, not to speak of improved translation. But it is time to begin asking a different set of questions of the available material, not only to help in interpreting the survey record but to exercise a reciprocal influence on the premises and priorities employed in the study of the texts themselves.

The field of investigation of this and the following chapter is necessarily limited. Insofar as possible, it skirts the often controversial questions of institutional structure and function that are as vital for a broad synthesis of social and economic history as they are for political history. Emphatically, this does not pretend to be any such synthesis. What it seeks to contribute to the eventual writing of such a synthesis is primarily an understanding of the ebb and flow, as well as the underlying, cumulative

trends of development, of those patterns of land use and settlement to which the findings of an archaeological survey are most immediately relevant.

An impression of ceaseless ebb and flow is particularly strong in the lengthy time period dealt with in this chapter. For our subject matter it greatly outweighs most of the differentiating features of the long succession of dynasties. Hence I adopt a form of discussion that places less emphasis on chronological sequence than was provided in chapter 3. Instead, at least as a first step and even as a predominant orientation, it seems more worthwhile to highlight the apparent poles between which all the contending dynasties tended to oscillate. Only in the concluding section of the chapter will I consider fairly briefly the actual sequence of Euphrates branches and the settlements that accompanied them.

References to ebb and flow, or to flux and stability, provide an important qualification to my earlier comment that increased locational stability made archaeological survey techniques less effective. As these terms imply, the larger towns continued to exert an attractive force on outlying populations over long periods. Agricultural improvements in their vicinity, and sometimes the advantages of enclosing defensive walls, must account for part of this. The occurrence in many cases of precincts devoted to particular divinities was surely also a factor, accounting for repeated reconstructions of temples as the pious acts of individual rulers as well as some inward flow of common people seeking the god's largesse or protection. But these attractions emphatically do not also imply stability in an individual settlement's size or even its uninterrupted occupation.

Little systematic attention has yet been devoted to the volatility of urban residence in early Mesopotamia, although this is at least beginning to be recognized as a significant theme for study (Limet 1972; Renger 1972; Adams 1975*d*, 1978). One aspect of what was probably a prevailingly oscillatory pattern with regard to size and prosperity is documented by numerous references to the sojourn of individuals in cities other than the ones they are identified as natives of. Merely to cite the Early Dynastic IIIa example of Shuruppak, by no means a town of major importance, Jacobsen has noted that "visitors to the city' (uru(-šè)gin) from almost all of the major cities of Sumer appear in the accounts as working for the palace and receiving rations." He also cites a difficult text and its variant that apparently list more than six hundred gurus (conscripted soldiers or workers), the Shuruppak contingent being smaller than those from Uruk, Adab, Nippur, Lagash, and Umma in spite of Shuruppak itself having been the provenience of the tablets (1952, pp. 121, 122 n.70). Movements into and out of the major centers by individuals primarily identified with smaller, less well known localities in their immediate hinterlands are likely to have been even more

numerous, but they were seldom or never noted as such in the available records.

Physical destruction and ensuing decline of population were certain to be particularly severe in the case of cities that joined unsuccessful rebellions, or whose ruling dynasts were overcome by others in battle. The traditional lamentations provide eloquently stylized literary accounts of this, while in other cases the combination of archaeological evidence with the testimony of a city like Ur's victorious opponent as to its destruction grounds the world of metaphor in harsh reality (Brinkman 1969, pp. 311-12).

Uruk may have suffered similar vicissitudes after its great florescence in the Early Dynastic I period, although in that case both literary and historical records are silent. Excavated remains of the later Early Dynastic, Akkadian, and even Ur III (excluding only the high terrace of Ur Nammu's ziggurat) periods are extremely sparse, if one considers the scale and duration of the archaeological campaigns in the vast ancient ruins. Surface ceramics in the northern part of the site suggest that the later part of the lacuna will presently be filled there (H. J. Nissen, pers. comm.), as indeed it should if there is any substance to the confusing references in the Sumerian Kinglist to a series of dynasts who both preceded and followed the Gutian interregnum (ca. 2200-2116 B.C.) (Cassin, Bottéro, and Vercouter 1965, pp. 96-97). However, the Early Dynastic II-III hiatus in material remains is still more puzzling. Perhaps it implies that the last Early Dynastic ruler, Lugalzagesi (ca. 2350 B.C.), assumed the title of king of Uruk after a series of conquests elsewhere without finding many living representations of the past glory of Uruk either to oppose or to support him (Sollberger and Kupper 1971, pp. 91-95).

For the present it seems safer to assume that excavations at major urban centers like Uruk in most cases will one day reveal a relatively continuous record of occupancy. Uruk, after all, was still able to furnish one of the larger contingents of men listed in the Shuruppak accounts mentioned earlier, well after the beginning of the putative hiatus. But it is perhaps worth noting that parallel, archaeologically grounded arguments have been advanced for the abandonment even of the great sanctuary of Nippur for as long as three centuries in late Old Babylonian and early Cassite times (Stone 1977, p. 270, citing McG. Gibson). Yet Nippur at the time was in no sense a political capital and so could not have been exposed, as was Uruk, to political reprisals.

As this suggests, flux and stability are persistent, closely intertwined, and yet obviously also mutually opposing themes. The heavy preponderance of towns and cities is as good an illustration as any. City walls and granaries reduced external risks and smoothed harvest fluctuations, which was surely conducive to stabilization. Yet, on the other hand, urban dwellers were more easily impressed

and disciplined into superior army detachments, as useful for predatory expansion as for passive defense. Precisely the existence of strong internal hierarchies and localized loyalties reinforced city-states as the primary polities of the time. Larger, more centralized groupings were periodically superimposed upon them, but both loose alliances and protoimperial formations were in most cases extremely transitory. As they disintegrated, it was the perennial, destructive rivalries between city-states that always reemerged.

✕ The essential point is that sequential or even simultaneous tendencies toward flux and stabilization are equally characteristic of the historic record of settlement and land use. Excessive water diversions for irrigation improve the short-run prospects for adequate or above-normal harvests, as we have seen, and in that sense enhance the stability and security of the society whose members resort to them. Within a very few seasons, however, the concomitant rise of saline groundwater seriously erodes or destroys agricultural productivity and thus has a highly destabilizing outcome. Excessive upstream diversions sow lasting seeds of discord with downstream irrigators, moreover, that may lead to the short-run subjugation of the latter but that can hardly be conducive to long-run social stability. Decisions made in the light of considerations like these naturally were modulated by many other factors as well. Hence the local outcome varied from time to time and place to place. There is not, and never was, a single, uniformly prevailing set of administrative and economic priorities with which the historical development of Mesopotamian society can be apprehended.

✕ The obvious political corollary of these remarks concerns parallel, ongoing tendencies toward centralization and fragmentation. With much wider application than its specific reference to the Old Babylonian period (1894–1594 B.C.), Yoffee has recently outlined a cyclical paradigm of imperial growth and disintegration that persuasively articulates these tendencies. In the vigorous, early years of a dynasty, he argues, an efficient, highly centralized “patrimonial bureaucracy” is largely recruited from among the kinsmen and dependents of the royal lineage. Its military and economic effectiveness is such that it consistently appropriates for its own ends a disproportionate share of the deployable resources produced by its conquered constituencies. That highly oppressive process engenders the formation of opposing alliances, especially since local elites, firmly rooted in their own communities, are by no means swept away or engulfed by the new political system. As constituencies and whole regions in time begin to break away, the resources with which the dynasty can impose its will progressively shrink. Local authorities are reinvested with powers to replace them, siphoning away resources for their own local ends and reasserting their hereditary rights. Often there is a proliferation of official titles as the dynasty

bargains away additional prerogatives in order to meet increasingly compelling short-term needs. The final rulers of a dynasty thus are left in the end as little more than figureheads in a largely disarticulated system. Hence the specific forces and events leading to their overthrow can be quite minor and almost accidental (Yoffee 1977, pp. 147–49). 1

Yoffee emphasizes that this is only a generalized, explanatory model, not a historical narrative in which every feature can be correlated with textually documented events and relationships. It is intended to introduce some order and coherence into the understanding of written records that in any case can never be expected to provide more than an exceedingly fragmentary account of ancient institutions from a very limited set of perspectives. But it is sufficiently generalized so as to apply with virtually equal relevance across the broad range of socioeconomic and managerial categories—“temple,” “palace,” “state,” “manorial,” and “private”—that have been variously thought to have been dominant during successive dynastic segments of the two-millennium span here under review. It places principal stress not on institutional forms appearing in particular communities as a result of a concatenation of circumstances, but rather on the “complex relationship between the political system and the local social structures, with no one overriding power completely co-opting the others” (Yoffee 1977, p. 149). The result is a picture of endlessly renewed struggle in the name of stability, of a ceaseless renegotiation of conflicting central and particularistic claims to power.

✕ In political regimes as in patterns of settlement and land use, it is thus clear that stability almost always may have been the objective, but flux was the prevailing outcome. It is also clear that the ordered hierarchies and traditions of individual towns do not provide an adequate basis for understanding this dynamism. The major source for the latter lay in the relations between a wide array of differentiated communities—differently constituted in terms of social organization as well as differently stratified, specialized, and endowed with resources. Throughout this chapter, in other words, we must strive to avoid the impression that the individual city-state and its hinterlands, or even a group of immediately neighboring cities and towns, constitutes the elemental, seemingly “natural” unit of study.

Arguably, individual towns or groups of towns were a more nearly adequate frame of interpretation in pre- and protohistoric times. Chapter 3 placed considerable stress on them, although it also made reference to massive population movements that could not have been strictly local in origin. But archaeology alone is at best somewhat ambiguous in this respect, and the circumscribed, poorly understood textual sources of Early Dynastic I and earlier times could provide little additional insight into longer-range patterns of interaction. For the later third and

second millennia, on the other hand, textual sources make clear that it was often the interactions between fairly distant centers, as well as the broadest, most extensive interregional relationships, that proved decisive. This also implies, of course, that the geographically constrained and somewhat arbitrary limits within which systematic data on ancient settlement patterns are so far available may considerably distort certain aspects of interpretation.

Consider a few fairly gross, well-understood patterns of interaction in which the central Euphrates floodplain, the primary focus of this study, was only part of a larger, integral unit. Kish, the references to which in royal titular strongly suggest that it must have attained political supremacy for a time in the early third millennium, lies well to the northwest of the region where an absence of contemporary cultivation makes intensive surveys possible. Babylon played an even more decisive role after the early second millennium, probably manipulating water supplies to gain military and economic advantage. Renger has suggested that the canals supplying Larsa in the south, Babylon's principal contender, were blocked or diverted already in the time of Sinmuballit (1812–1793 B.C.) and that his successor Hammurabi (1792–50 B.C.) later relied on the same measure in his successful quest for political dominance over all the city-states of the alluvium (1970, p. 78). With such policies in effect, Babylon's fortunes were a harshly imposed reciprocal of the well-being of cities situated below it in the floodplain: Babylon's own growth, not to speak of the widespread colonization and canalization around it in the Old Babylonian period (Adams 1972, p. 186), either led to or was made possible by equally widespread abandonments farther southeast. After achieving political ascendancy, of course, Hammurabi's interests shift to the restoration of the now submissive countryside. Under those altered conditions we find him taking credit for having dug a canal named "Hammurabi Is the Prosperity of the People" to furnish water to the major southern cities (*Reallexikon der Assyriologie* 2:180, no. 135, s.v. *Datenlisten*). Both Kish and Babylon, in their changing relationships with cities like Nippur, Isin, Adab, Umma and Uruk, Larsa and Ur, illustrate the potential conflict of interest between upstream and downstream irrigators for supplies of water that were not infallibly adequate to meet both sets of needs. The same source of rivalry, generally to the ultimate detriment of the downstream consumer, not only occurs among distant political capitals but can also be found among relatively small, adjacent communities (Adams 1975d, p. 4).

A related set of problems arises if we turn to the eastern peripheries of the surveyed area. The kingdom of Lagash lies in its entirety beyond the intensively surveyed limits, and so far it has received only brief and limited topographic scrutiny (Jacobsen 1969). The textual sources

from third millennium Lagash, on the other hand, are by all odds the richest and most informative of any with respect to a broad range of social and economic questions of the kind relevant to this study. There is a tantalizing mismatch of textual and archaeological data, in other words, underlining the inadequacy of the surveyed boundaries as they exist at present. Since heavy deposits of silt have been laid down by the present-day Shatt al-Gharraf and its effluents along what must have been the western borders of Lagash, moreover, it is not clear how much surface reconnaissance in that direction can ever contribute to an improved understanding of geographical interrelationships.

Textual sources leave no doubt of recurrent, sanguinary struggles between Lagash and Umma over a contested tract of fields some 41 square kilometers in extent (Pettinato 1970–71, p. 306). Once more it appears, therefore, that purposeful interruptions in the supply of water by Umma to Lagash, the downstream user, were both an expression of the underlying conflict over a potentially scarce resource and an immediate pretext for the resumption of overt hostilities (Jacobsen 1969, p. 106). A further measure of response by Lagash rulers, just as by Rim-Sin of Larsa (1822–1763 B.C.) during the last desperate phases of his resistance to the advance of Hammurabi (Renger 1970, p. 78), was the construction of an alternative feeder canal from the Tigris. While not a viable long-term solution to water supply interruptions, for hydrological reasons outlined earlier, repeated recourse to this step confirms that the natural regime of the rivers was no longer only passively accommodated to through localized, small-scale irrigation along the backslopes of adjacent natural levees. Fairly lengthy canal construction was now a practical possibility; indeed, essentially artificial canals more than 15 kilometers long have been identified on purely archaeological grounds as having already been in existence before the end of the fourth millennium (Adams and Nissen 1972, p. 12). Purposive actions on a new scale thus were becoming an increasingly significant factor in modifying the food supply and habitat either for better or for worse. Stabilization or the enhancement of local advantage must have been the immediate objective in most cases, but as often as not the outcome was a destructive oscillation between water surplus and water shortage.

Thus far we have dealt with "boundary problems" as if the primary difficulties associated with a circumscribed geographical frame of analysis arise from the exclusion of particular realms or city-states essentially similar to those that are included. This is, indeed, *one* problem. At least in certain periods urban interrelations can be visualized as a zero-sum game in which the gains of one or a few centers in southern Mesopotamia are more or less evenly counterbalanced by the losses of many others. Hence, the omission of particular contenders from the discussion, especially a city of central importance like



Babylon, would involve a serious distortion of conditions on the Mesopotamian plain as a whole. But the application of the zero-sum game metaphor to the Mesopotamian alluvium encounters further dangers in that it rests on an acceptance of the physiographic boundaries of the plain as a factor of constant and decisive importance. Insofar as the radius of interaction from time to time extended beyond this zone, use of the metaphor is at least partly contradicted by more distant patterns of relationships that yet help to explain cycles of growth and decline affecting the whole region.

Assyrian ascendancy during the last century or so before the fall of Nineveh furnishes an instance of this, although unfortunately it is one that cannot yet be illuminated by the findings of an archaeological reconnaissance. Massive deportations at that time must have substantially, if perhaps only temporarily, reduced the population of tribal regions in southern Babylonia. The brunt may have been borne by semisedentary groupings that left little tangible debris, but many of the smaller Middle Babylonian settlements that are recorded in figure 35 also must have been adversely affected. That cannot be shown in the poorly dated surface materials attributed to this period, however, since not less than three or four earlier centuries are conflated with the period of unquestioned Assyrian dominance. Note that the period as a whole was one of marked reduction in sedentary population. Clearly, therefore, that was a trend that considerably antedated the successive Assyrian deportations, having its origins at a time when political relations between Assyria and Babylonia fluctuated repeatedly but on the whole were fairly evenly balanced. In any case, population transfers of this kind exemplify the shortcomings of the zero-sum game metaphor. And one should remember that such transfers had occurred in the opposite direction during earlier intervals of southern ascendancy, including the Akkadian, Ur III, Old Babylonian, and Cassite periods.

The same need for a flexible, periodically widened framework of analysis is further illustrated by the balance of relations between Mesopotamian cities and the Elamite realm in southwestern Iran. An imposed flow of people as well as resources can once more be documented in both directions. The frequency, although perhaps not the scale and decisiveness, of movement between Susa and its Mesopotamian counterparts bound these two geographically detached regions together in spite of the considerable distance separating them. Especially during episodes of expansion and contraction, in other words, an assessment of the balance of gains and losses between neighboring city-states must be supplemented by recognition of less symmetrical, much more widely extended patterns of reciprocity reaching well outside the Euphrates floodplain.

There is a final broad class of interrelationships to be mentioned, between Mesopotamian towns and the semi-

settled or wholly pastoral peoples who periodically moved around and among them. The primary cultural significance of the alluvium, that is defined a semiarid but potentially irrigable zone, was at least initially meaningless to these peoples. Their concern was with rangelands for their flocks, whether dependent on rainfall, seasonal flooding, or the residues of cultivation. Their movements accordingly cannot be understood within a circumscribed geographical framework but instead trace a continuum along the whole of the Fertile Crescent, as well as into adjacent mountainous regions. Urban relationships with them transcend the scope of the present study in still another respect, for ordinary archaeological means are seldom sufficient to detect the presence of even substantial numbers of herdsmen who were widely dispersed in temporary campsites.

Periodic attempts were made to interdict the natural paths of movement of these semisedentary folk, sometimes on a scale as massive as that of Shu-Sin's (2036–28 B.C.) Wall against the Martu, which is said to have run for some 280 kilometers from the Euphrates to the Tigris and even farther eastward (Wilcke 1969–70, p. 9). This could have been effective to a degree in slowing the penetration of large, cohesive tribal units, like those often threatening to dominate the middle Euphrates around Mari. However, similar formations were for the most part not in evidence in Babylonia (Moran, comment following Adams 1975*d*). Fortifications and urban-based armies there would have been much less of a deterrent to seminomadic herdsmen organized into smaller, more splintered groupings. In general, even the best-organized efforts were only briefly and partially capable of resisting large-scale population movements that took the form of small, mobile, fluidly composed groupings.

This is a theme extensively dealt with by Rowton in an ongoing series of studies on nomads and the “dimorphic structure” of ancient Near Eastern societies. He has called attention to the relative narrowness of the alluvial zone occupied by ancient cultivators, a point greatly strengthened by the new archaeological evidence presented in this volume, and to its resultant openness to nomadic incursions. To the north and east of the main band—or, better, intertwining series of ribbons—of ancient settlement lay a zone of gradually increasing but characteristically undependable rainfall as one approached the Taurus-Zagros piedmont. Grazing lands generally preponderated over lands devoted to dry agriculture there, and the extent of the latter was in any case at the mercy of numerous minor climatic fluctuations. Hence this “dimorphic zone” constituted a kind of “pastoral corridor” that served repeatedly to channel new groupings of nomads and seminomads into close proximity and hostile interaction with the great urban centers of the Mesopotamian alluvium and their outlying dependencies (Rowton 1973, pp. 252–53; 1976, pp. 20–24).

There are two respects in which I would slightly modify Rowton's reconstruction. A first and quite minor one concerns his emphasis on the dependence of rangeland on adequate local precipitation. This unduly narrows the potentialities of nomad movement and even dominance. We need to take fuller account of the effects of seasonal flooding along the Euphrates and of the importance as fodder of deep-rooted perennial weeds whose roots reach the sub-surface water table in irrigated fields left fallow during alternate years. On the alluvial plain itself, therefore, conditions for pastoral movement were virtually as propitious along the Euphrates as along the Tigris, in spite of relatively modest differences in rainfall favoring the latter. But this is only a slight shift, to be sure. In a sense it reinforces Rowton's primary emphasis on the vulnerability of the urban zone, adding penetration along its Euphrates flank to that along the Tigris. The existence of an irregularly oscillatory pattern, involving major as well as minor shifts in the power relations and relative proportions of nomads and sedentary folk, seems impossible to deny as a recurrent, fundamental feature of the entire historic record (Rowton 1976, pp. 24-27; cf. Adams 1975*d*).

The second, more substantial difference involves the nature of the distinction between pastoralists and cultivators in early Mesopotamia. Rowton's repeated references to dimorphism tend to delineate two sharply contrasting, essentially antagonistic life-styles, pursued by ethnically as well as structurally distinctive groups. In his view, interaction, apart from hostile encounters of variable outcome, apparently takes the unidirectional form of sedentarization of the nomadic or seminomadic elements. As I have already adumbrated in chapter 1 and elsewhere, I regard the groups immediately concerned as having been more in flux and less polarized. Ecological relationships documented in recent contemporary Mesopotamia may, of course, be qualitatively different from ancient ones. But on the whole this seems less likely than that the accounts of ancient scribes, officials, and literati do not supply us with entirely balanced and comprehensive testimony on matters from which their authors were socially remote and of which they were technically ignorant. As is the case now, predominant emphasis on husbandry or cultivation frequently must have been a shifting, pragmatic decision. Across the frontiers of cultivation there usually must have extended a structural and ethnic continuum, with the acculturation of particular groups proceeding backward and forward between nomadization and sedentarization according to circumstances. If so, the main effect of semisedentary groups upon the predominantly urbanized body politic of the lower Euphrates core lands is not likely to have stemmed from their alien background and direct military potential. Instead, it was their embodiment of a practical and at times even preferable alternative for an oppressed rural peasantry and its counterparts in the semiurbanized working force, upon whose

continuing, docile productivity the whole edifice of power, privilege, tradition, and ceremony that was lodged in cities ultimately depended.

## URBAN HIERARCHIES AND CONTINUITY

What can be said of the size and agglomerations of functions that characterized Sumerian and Akkadian cities? The actual hierarchy of town and city sizes, insofar as it can be derived from survey data whose limitations have already been indicated, is a strictly delimited empirical question to be dealt with separately. The range of activities and functions carried on in cities, on the other hand, is largely beyond the scope of this study, since it would require a *tour d'horizon* of virtually the entire corpus of cuneiform and archaeological sources. Insofar as cognitive categories are suggested by nomenclature, however, there is nothing to indicate that the use of the term for city was tied either to a minimal size of settlement or to the presence of specific urban institutions. The Greek city, clearly identified with an autonomous group of citizens and the politicoreligious institutions through which this group found its corporate expression (Martin 1956, pp. 30-32), clearly belongs in a different tradition. Perhaps the main difference is that the Sumero-Akkadian city was a locus of contingent, shifting powers and prerogatives, whereas the Greek city was built around a more self-conscious, formally constituted civic body.

Surveying the Sumero-Akkadian literary evidence, Hallo has collected references to a proliferation of formal synonyms and antonyms for Sumerian *uru*, Akkadian *ālu*. But he also notes that in connected, nonliterary contexts "the concept 'city' is expressed by a single term throughout virtually all the long history of cuneiform" (1971, p. 58). Leemans, similarly, speaks of cities and towns as having been "indiscriminately lumped" under *uru* and *ālu* respectively: "If we translate it by 'city,' we use this term in the wide sense of a big walled town, generally with an important temple. . . . It is more difficult to distinguish between town and village, *ville* and *village*, etc. In some texts, especially in the Old Babylonian period, the village is denoted *kaprum*, corresponding with Sumerian *e-duru*, denoting a rural settlement" (1975, p. 135).

Edzard, following North, offers a further qualification: *kaprum* is not used in connection with nomads or semi-sedentary folk, but only for small sedentary settlements on the alluvium (1964, p. 145). Finally, the Chicago Assyrian Dictionary provides a generalizing comment on this lesser category: "The semantic range of *kapru* extends from 'village' in agricultural surroundings, 'farm' for the producing of barley, 'settlement' of shepherds of a more or less permanent nature, to suburban agglomerations around cities. In the plural (*kaprātu*) the word refers also, in a general way, to out-of-town regions" (8:190, s.v. *kapru*).

Thus we can identify a two-stage hierarchy of settlement that persisted throughout Sumero-Akkadian nomenclature, a term for cities of very broad application and a more amorphous category of small rural settlements. Additional terms are known that refer (at least in some contexts) to inhabited places of minor importance. *Maš-kanu*, literally a threshing floor, appears as early as Old Akkadian times in a context suggesting that it meant a fairly important rural place. Curiously, however, there were seventeen *uru-sag* or "main towns" in Lagash during the time of Rimuš but only eight *maš-ga-na-sag*, perhaps "main [smaller] settlements" or "encampments," to go with them (Falkenstein 1966, p. 41; Hallo 1971, p. 58, n. 14). This contradicts what is generally known of nested hierarchies of settlement, in which lesser orders are always several times more numerous than higher ones. Hence it is possible that the term referred not to a settlement in the usual sense, but to some functionally specified rural place, perhaps a centrally administered agricultural depot. Mainly in late (Neo-Assyrian) times, a qualification of the word for city comes into use with similar rural qualifications. URU.MEŠ "seems to denote a settlement, probably a manor" (Chicago Assyrian Dictionary 1/1:387–88 s.v. *ālu*). Of course, references to other special-purpose sites of limited size, such as fortifications, are not uncommon throughout the historic record.

Reference has already been made to *uru-sag*, literally head-city. In the Akkadian period this must have included some fairly modest district capitals, since there were seventeen *uru-sag* within an area of rather less than 1,600 square kilometers. By the time of the Third Dynasty of Ur, however, the term has come to refer (in Neo-Sumerian personal names) only to the imperial capital. There are several other Sumerian terms with similar connotations, all equated in Akkadian lexical texts with *ālum elūm*, high or upper city (Hallo 1971, p. 60). References to a hierarchy of urban importance tend to be more consistent and explicit in Neo-Assyrian annals, where Sennacherib, for example, proclaimed his conquest of "a total of 88 strong, walled cities of Chaldea, with 820 hamlets within their borders" (Luckenbill 1924, p. 54).

A somewhat untidy scheme of conceptual categories emerges from this discussion, although perhaps no more untidy than is to be expected when evidence is eclectically drawn from royal annals, lexical lists, administrative texts, and personal names over two millennia. Comparable terms in contemporary English are, after all, no less elastic. The title "city," particularly in the western United States, is often only a reflection of the original settlers' aspirations. "Town" can extend in meaning from very minor settlements to major ones, the latter especially in informal usage (into town, downtown). The city-town-village trichotomy has little functional significance, in fact, except for formal analytical purposes. More disquieting as a reflection on discrepancies that may have lain behind the Sumerian

and Akkadian terms is contemporary Iraqi administrative usage. Cities and towns are centers in which governmental functions are exercised, and in censuses and statistical abstracts they are frequently recorded as being considerably smaller than neighboring settlements classified as villages.

Returning once more to Hallo's overview of the cuneiform sources on this subject, the antonyms of urbanism are also instructive:

In literary Sumerian, the contrast "town and country" is commonly expressed by the pair *uru* and *á-adam*, literally "town and pasture"; when used in an additive sense, the pair implies the totality of human settlement. . . . While one can only speculate about the etymology of *á-adam*, other Sumerian antonyms for the city put transparent stress on the hydraulic basis of the cultivated countryside. In contrast to the city, it is "that which is fructified with water" (*a-ri-a*, *é-ri-a*); it is "the moistened ground" (*é-duruš*) or the "irrigation district" (*a-gàr*, literally perhaps the "water pocket"). Most of these terms passed with little change as loan words into Akkadian (*eduru*, *ugaru*).

With reference to the lexical texts and thus principally to the high literary language, the contrast clearly defines at least one feature of the conceptual world of scribes and functionaries:

on the one side a diffuse, subjective, functional diversity of descriptive terms for the countryside, reflecting the urban point of view and a succession of different linguistic strata; on the other a single term for the city, reflecting a basic common distinctiveness that apparently outweighed whatever external differences divided the cities of one age or place from another. [Hallo 1971, pp. 58–59]

To summarize further, it appears that only two additional generalizations can be made with reasonable confidence about that cognitive categories of ancient settlement. First, recognition is given to a subordinate, functionally specialized, nonurban class of settlement, the comparative paucity of references to it presumably reflecting its lack of salience in the minds of urban scribes and administrators. Second, slightly redirecting Hallo's comment, the term city was applied, often with adjectival qualifications, as a broadly inclusive category referring to settlements of very limited size as well as to the very largest ones. From that point forward, however, we need to turn to empirical evidence from the survey on what the changing size distributions actually were.

The basic data on changing settlement size from Early Dynastic through Middle Babylonian times, drawn from the descriptive statements given in the general site catalog, is presented serially for all relevant sites in table 14 in the appendix to this chapter. As I noted above, I have employed fairly broad categories of size rather than specific

estimates, reflecting the impressionistic quality of much of the evidence. The smallest category, of 4 hectares or less, presumably applies to villages, small manors, specialized agricultural, processing, or defensive facilities, and perhaps in some cases temporary encampments of non-sedentary peoples as well. The third through sixth categories, covering settlements from just over 10 hectares to more than 200 hectares, presumably fall in virtually all cases within the *uru/ālu* "urban" designation of our ancient informants.

More doubt attaches to category 2, from 4.1 through 10.0 hectares of surface area. Quite possibly this conflates some marginal "cities," some specialized facilities, some manorial estates, and some larger "villages" according to the classification of the time, but the limited findings of a surface reconnaissance provide no means for introducing a finer separation. Ultimately the test will come with more extensive soundings in sites of the smaller and intermediate categories. Villages, one assumes, probably were the loci of a relatively undifferentiated stratum of peasant cultivators, and hence should yield at most quite circumscribed kinds and amounts of textual material. Whatever provided a basis for including a particular settlement within the *uru/ālu* category, on the other hand, probably included at least some record-keeping and other forms of more or less regular involvement with elites and administrators in the major centers.

It must be conceded that any such simplistic separation as this will probably be confounded by wide variability in ancient practice. At least in northern Babylonia, some very small settlements were substantially involved, not merely in routine record-keeping, but in more complex forms of scribal and administrative activity. Tell al-Dhiba'i, ancient Uzarzalullu, for example, covers only about 4.5 hectares, yet excavations there have brought to light not only a temple of considerable size and the elaborate metalworking installation and perhaps shop of a smith, but also a large collection of tablets including a mathematical text with our earliest known application of the Pythagorean theorem (Mustafa 1949; Baqir 1962; al-Gailani 1965; Abdullah 1967). Nearby, impressively walled Tell Abu Harmal, ancient Shaduppum, was still more directly, perhaps even primarily, engaged in administrative responsibilities usually thought of as "urban." Its site plan includes a temple as well as other public buildings, and there were numerous administrative, business, lexical, and mathematical documents, although it did not exceed 1.8 hectares in area (Baqir 1947; al-Alusi 1959, pp. 47-48). Directly comparable cases are not yet known within the intensively surveyed area dealt with in this volume, largely because in the south excavators' attention has been all but exclusively directed to the great ancient cities. Tell Sifr, ancient Kutallu (site 448), is perhaps the smallest site yet to have yielded documents, but it occupies an area of nearly 30 hectares (Loftus 1857, pp. 263-72). A further

difficulty, of course, is that the use of writing on such sites may well have been extremely localized. Hence there is nothing to ensure that evidence for it will be found without a fairly extensive program of soundings.

Table 14 is intended as an aid to the specialist interested in the history of occupancy at particular sites or groups of sites. Figure 25 further summarizes and abstracts the same data, identifying trends in settlement across the two-millennium span. It provides a breakdown by period and size category of the 441 sites occupied for varying intervals during this span. Horizontal connecting lines across the interstices between the vertical columns are intended to give some measure of the degree of continuity between major periods, since their height is determined by the aggregate numbers of sites occupied in both periods.

There are discrepancies in the quality of data from period to period yet to be dealt with, but they should not introduce significant distortions into estimates of the proportions of settlements of different size within a particular period. Differences are likely to be small, in other words, between the range of ceramic types that can be identified on large sites as compared with contemporary small sites. It seems to follow that shifts over time in the proportions of the total settled area occupied by large and small sites are a reasonably accurate index of changes in the urban hierarchy. The proportions form a strikingly regular, even dramatic, progression, as table 12 shows.

TABLE 12 Declining Proportion of Urban Settlement in the Third and Second Millennia B.C.

Period	Percentage Nonurban (10 ha or less)	Percentage Large Urban (more than 40 ha)
Early Dynastic II/III	10.0%	78.4%
Akkadian	18.4	63.5
Ur III-Larsa	25.0	55.1
Old Babylonian	29.6	50.2
Cassite	56.8	30.4
Middle Babylonian	64.2	16.2

It is evident from these figures that urbanization reached maximum proportions in late Early Dynastic times, roughly in the middle of the third millennium B.C. From that time forward, for more than the following millennium and a half, trends in settlement ran strongly and cumulatively in the opposite direction. At least until the end of the Old Babylonian period, however, it is also evident that the bulk of the southern Mesopotamian population not only remained urban but continued to cluster disproportionately in cities of very large size.

The overwhelming concentration in large cities for a considerable part of this sequence must be regarded as a hypertrophic, "unnatural" condition for an agricultural civilization with preindustrial transport technology. Fol-

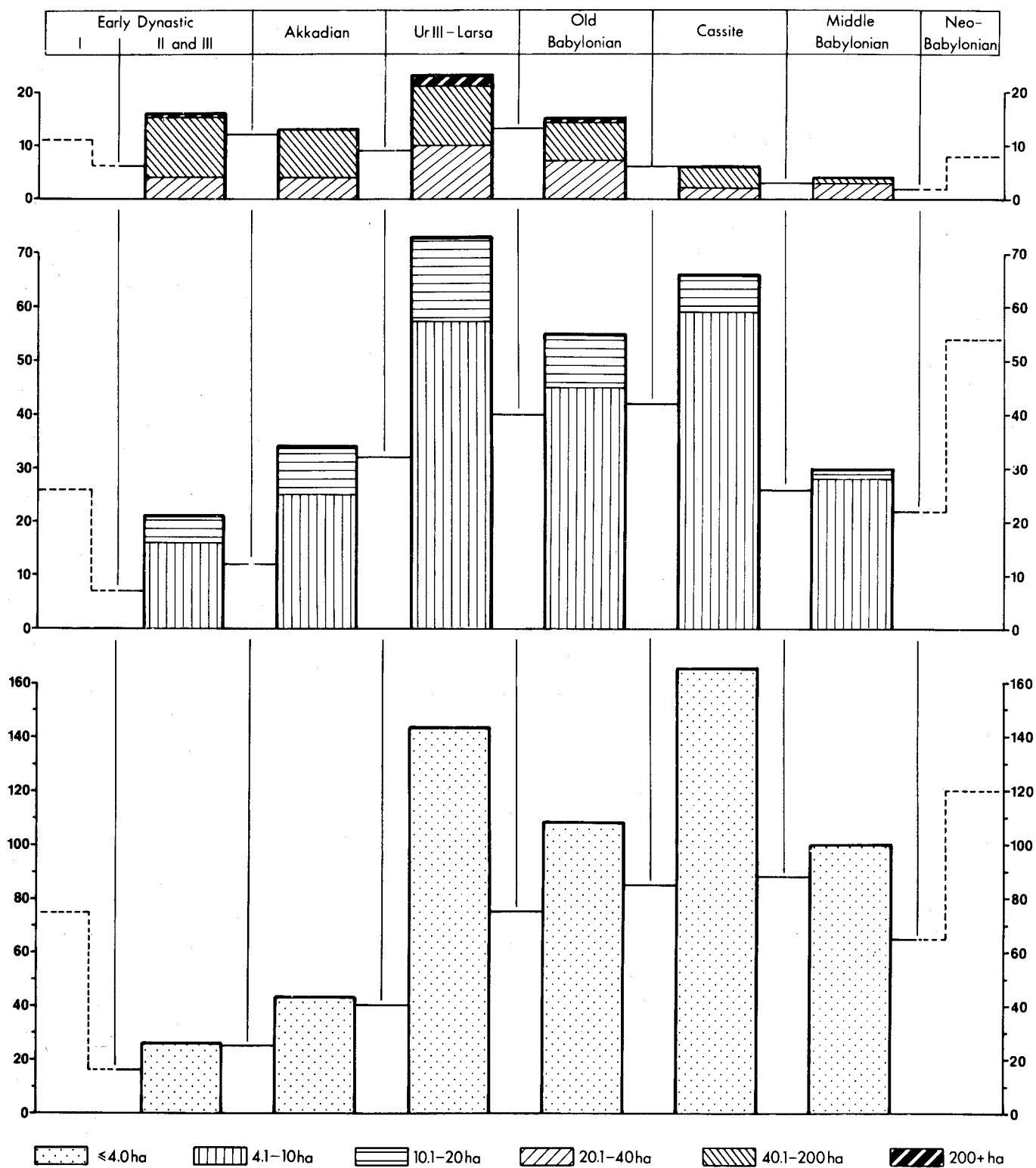


Fig. 25. Settlement numbers and hierarchy of size in earlier historic periods.

lowing the standards of population density in settlements and cultivated land requirements per person that were applied earlier (see above, pp. 69, 85), the median distance to a field used as a source of subsistence for a site of 10 hectares or less would have been less than 1.6 kilometers. For an early city covering more than 40 hectares, on the other hand, the median distance would have been more than 3.1 kilometers. In the latter case the average daily travel time to and from fields thus was an hour or so longer, or even more with teams and agricultural impedimenta, to the marked disadvantage of cultivators living in the larger urban centers.

This should not be taken to imply that a law of "least effort" prevails uniformly in matters of settlement. Were that so, urban concentrations of any kind would be quite inexplicable. A dispersion of cultivators into smaller communities often must have been an immediate consequence of changes in social stratification and land tenure arrangements, or of an improvement in rural security. The latter, in particular, would tend to counteract one of the principal forces that probably had produced hyperurbanization in the first place. Ethnic factors may also have played a role, with incoming semisedentary folk normally gravitating to small, newly founded communities of their own. There was a particularly large shift in relative proportions of small and large settlements at the outset of the Cassite period that may well illustrate this process. But the debilitating loss in agricultural efficiency that large cities faced, because of the wider belts of cultivation they needed, must have been a steady and sometime decisive force behind the progressive, long-continuing dispersion.

Returning to figure 25, further consideration must be given to the horizontal lines between the columns that provide some measure of continuity between successive periods. To be sure, ceramic index fossils confirming occupation of a site in two successive periods do not necessarily indicate that it was continuously occupied during both of them. If Gibson is right, even a major center like Nippur could have well-documented Old Babylonian and Cassite occupations and yet have been abandoned for several centuries between the two (see above, p. 132). But the proportion of sites of one period on which an occupation during the following period can also be confirmed is surely related to the degree of continuity between the two periods. A high proportion is a necessary but not sufficient condition, one might say, for a high degree of residential continuity.

Several general observations about continuity emerge directly from figure 25. The larger cities, not surprisingly, seem to trace out the smoothest curve over time, with least evidence of deep interstitial troughs between major periods. However, there is nothing to suggest that the smallest settlements, those in category 1 covering an area of 4 hectares or less, were significantly more volatile in their patterns of occupancy than the towns and small cities in

the two next larger categories. On the whole, settlements of all sizes exhibit roughly the same patterns of continuity between periods, save that the interruptions are somewhat damped for the largest ones. On two occasions, however, after the Early Dynastic and Akkadian periods, the small "village" sites appear to have been at least as stable as all of their larger counterparts.

Bearing in mind that considerable periods of abandonment may have occurred that would not necessarily be detected with the reconnaissance methodology followed in this study, figure 25 suggests that at times there was relatively high turnover. The tops of the columns trace out a more rapidly fluctuating curve than the troughs between them, since the former include a component of single-period occupations that may have occurred in response to various temporary state programs of expansion while the latter are based only on sites that persisted through at least two periods. Differences from one column to the succeeding one must reflect substantial, continuing processes of sedentarization and population growth if the later exceeds the earlier in height, or the reverse if it does not. But comparing succeeding crests with the trough between them is also instructive. In most cases the troughs are substantially lower than both adjacent columns. The difference between the site count of the trough and the site count of the lower of the two adjacent columns is at least a rough measure of the proportion of total settlement that was abandoned and then fairly quickly relocated elsewhere, as distinguished from net increases or decreases in the settlement pool and from those that were continuously occupied. In some cases this applies to almost a third of the total. Intervals of especially disruptive relocation, as identified in this manner, will be observed during the transitional phases leading into the late Early Dynastic, Old Babylonian, and Cassite periods and must suggest particular volatility in conditions affecting settlement at those times.

Several factors may be responsible for these oscillations. Certainly one is the physical destruction or forced transfer of communities in a period of unification following interdynastic rivalries. Improvements in the irrigation system are another, frequently mentioned concomitant of control by new dynasties. Newly dug or desilted canals and heavy investments in facilities like weirs and regulatory headworks would have attracted settlers even without an element of compulsion. While the construction and maintenance of major new irrigation works was usually claimed as a royal responsibility, in practice the state seems generally to have limited its role to providing the necessary resources to intermediary labor brokers or local community headmen and then inspecting periodically to assure performance (Walters 1970). Without discounting the presence of a strongly authoritarian element in the organization of dynastic states, therefore, there is reason to be skeptical that the primary cause of repeated aban-

donments and resettlements were levees en masse to open up new areas for irrigation or other, similar applications of direct, centralized control. To recall the example of Arab cultivators in the last century, moreover, they were able to build and maintain fairly extensive local irrigation systems without the assistance of—even in the face of occasional military opposition from—the Ottoman state officials in Baghdad (see above, pp. 23–25; Moritz 1888; Fernea 1970; Adams and Nissen 1972, chap. 5). At least some of the turnover in settlement evident in figure 25, particularly that among the smaller sites, thus may have been outside the realm of state interest or concern. That would apply particularly to nomadic or semisedentary elements in the population that had not yet been integrated into—or that had broken away from—such ongoing institutions of state authority as there were in the remote countryside.

An additional factor reducing continuity of occupancy has been suggested previously. In connection with the tenuousness of any reconstruction of local geographic and socioeconomic trends as a zero-sum game, I referred to interdictions or diversions of some of the major rivers and canals by upstream dynastic contenders. Downstream rivals naturally would seek to restore the needed supplies of irrigation water insofar as they were able; by regularly maintaining a variety of alternative water sources, by hurriedly constructing substitutes that would serve at least for short-term, emergency use (e.g., a canal from the Tigris), or by military action. The net effect was increasingly to convert the basic hydrographic system of the region from a feared but accepted natural condition into an object of conscious manipulation. Herein must lie a potent destabilizing influence on settlement—though one whose actual importance in any given instance may never be convincingly established.

The difficulty in determining how far this factor was effective stems from the always ambiguous intersection of human actions and intentions with the powerful and unpredictable behavior of a natural river system. Under strong kings like Hammurabi (1792–50 B.C.) any outcome, whether the diversion of flow away from the competitors or the preservation of the existing system, probably was by design. Sufficient time, control, and resources were at hand to restore even the main body of the Euphrates to its bed if it breached its banks during a flood and broke away to form a new, undesired course to the west. Under weak kings, on the other hand, a diversion might be dug and encouraged to grow as a political expedient, but the means frequently must not have been available subsequently to restore the status quo. In the declining years of a dynasty, moreover, flood breaches surely appeared in weakened dikes without any human intervention and then could not be repaired with the limited forces at hand. At least according to the account of Baladhuri, this was the origin of the Great Swamp at the end of the Sasanian

period (Le Strange 1905, p. 27). Only if diversions can be assigned to a particular reign, in other words, can they be attributed with confidence to human as opposed to natural agencies. But while the survey data document a major westward movement of the Euphrates during the early to mid-second millennium, surface collections are characteristically inadequate to support a dating within such close chronological specifications.

The question of volatility of settlement has heretofore been viewed solely in terms of changing conditions on the central Euphrates floodplain. In those terms, it has been possible to speak of an at times considerable turnover in occupation from one period to the next, and to suggest some of the factors that may have been involved in it. But we must conclude this section by considering the question in a somewhat wider context. In relation to Henry Wright's discussion of the region around Ur in the Appendix to this volume, this area was strikingly more stable in almost every respect. Wright finds, for example, that almost 90 percent of his Late Larsa–Old Babylonian sites (essentially the same as those called Old Babylonian here) had not been occupied during the preceding period, and that the same applies to almost 80 percent of his Cassite sites. For central Sumer these figures are much lower, 36 and 46 percent respectively. Here we find a remarkable demonstration of the greater continuity that obtained in the core of the alluvium than along at least its southern peripheries. In other words, stability was directly correlated with centrality. If settlement is any indication, it is to the core of the heartland that we should look not only for the firmest retention of traditions but for leadership in all those institutions and arts whose cumulative growth is encouraged by not being repeatedly and forcibly transplanted.

#### UPPER AND LOWER LIMITS OF SETTLEMENT, AND ASSOCIATED PATTERNS OF LAND USE

The urban hierarchy, as elaborated in the previous section, has few, and only rather general or indirect, implications for an understanding of the patterns of subsistence on which it was based. It is reasonable to argue, for example, that the clustering of a large proportion of the population in the uppermost tiers of the hierarchy suggests a fairly high level of agricultural productivity. Otherwise the necessary subsistence resources would have been dispersed over intolerably wide areas. A heavy urban concentration also suggests a rationalized and efficient system for transferring the foodstuffs into the cities. At a Bronze Age level of technology with limited and inefficient wheeled transport, the necessary scale of the operation implies primary reliance on movement by boat and barge. x

It is difficult to imagine a set of conditions more conducive to the precocious development of urbanism, be-



fore the onset of industrialization, than those that obtained on the ancient Mesopotamian plain. A "corona" of irrigation agriculture around each town (Oppenheim 1969, p. 6) provided substantial yields of cereals, dates, and garden crops, the heightened irrigation requirements and productivity of the gardens and orchards dictating that they should be concentrated immediately around the towns, while the fields could lie farther away. Networks of natural waterways, easily modified or extended in the absence of any natural obstacles, provided the necessary arteries of large-scale transport. Also provided by these lagoons and waterways (as well as by the waters of the Gulf, not far away) was a habitat for fish, probably the most significant source of protein.

Meanwhile the herds, primarily of sheep and goats, occasionally received cut barley but on the whole were alternately pastured on gleanings and stubble in outlying fields, on young growth of barley, in seasonal depressions as the water receded, and on the sparser but ubiquitous vegetation of the open steppe (Nissen 1976, p. 33). Cattle, present only in more limited numbers (on the order of 10 percent of the number of sheep and goats), must have been kept closer at hand, both because their primary use as draft animals required this and because the sparse textual references to milk are almost entirely to cows' milk. Goats' milk, apparently obtained from flocks generally kept too far from the cities to be imported before spoiling, was converted to butter and cheese in minor quantities and otherwise must have been consumed locally by pastoralists and rural cultivators. Sheep and goats were thus the most distant component of the system, but as sources of wool, hides, and (much less important) meat they could be driven at little cost to the places of processing or consumption. A single herdsman could adequately supervise a flock of about a hundred sheep and goats, including moving it to new feeding grounds and even into the cities for disposal.

To go beyond this harmoniously meshed but purely qualitative picture, we must turn from enumerating types of resources and their procurement to assessing their probable scale. Just as the proportions assigned to different tiers in the settlement hierarchy shifted through time, so we must assume that the total in all the tiers was not static but tended to fluctuate. The reliability of the evidence for different periods also fluctuates, undermining any attempt to reach a fully independent estimate from survey data. What is available from the survey, moreover, consists only of estimates of site area. As I have already argued, the relationship of site area to population was surely not static and in any case was at best a fairly loose one. Thus the question of scale is complex, and the answers to it will be necessarily problematic. But only through a quantitative comparison of different periods can we form an impression of the dynamics of the underlying demographic and economic system, of which the pre-

dominance of different categories of settlement are on the whole only a passive reflection.

Figure 25 provides at least a rough indication of relative population levels during successive periods. Apart from other problems, precise estimates are precluded by the fairly broad brackets for each of the size categories. As a first step toward an approximation, the midpoints of the six categories may be said to form the following sequence of ratios in hectares: 2:7:15:30:100:200. By multiplying the number of sites in a particular category and period by the relevant ratio, we can construct an admittedly rough and provisional index of total settlement areas. This is given in table 13. The area totals therein

TABLE 13 Totals of Assumed Site Areas in Hectares, by Size Category and Historic Period

Period	Size Category						Total
	("Village")			("City")			
	1 (±2 ha)	2 (±7)	3 (±15)	4 (±30)	5 (±100)	6 (±200)	
Late Early Dynastic	52	112	75	120	1,100	200	1,659
Akkadian	86	175	135	120	900	—	1,416
Ur III-Larsa	286	399	240	300	1,100	400	2,725
Old Babylonian	216	315	150	210	700	200	1,791
Cassite	330	413	105	60	400	—	1,308
Middle Babylonian	200	196	30	90	100	—	616

can be converted to a yet rougher approximation of population by multiplying once again by our familiar—and probably conservative—constant of 100 persons per hectare (but recall that the constant applies not to net site areas but to larger rectangular areas enclosing sites at their longest and widest dimensions). Added to the undoubted variability that this (or any other) constant masks, however, are the uncertainties introduced by using not actual size estimates but size categories. The cumulative discrepancies thus may be large, and a conversion of areas to population levels admittedly must be very speculative.

Even as relative proportions, without attempting to specify their significance for the determination of absolute population levels, there are difficulties with these figures that should not be ignored. The entries depend, to a greater degree than in similar tabulations in the previous chapter, on the identification of ceramic "index fossils" whose spans of use either are poorly known or cannot be unambiguously assigned to a single period. Particularly doubtful are the groups of types used to identify the Akkadian and Middle Babylonian periods, for neither of which could I unequivocally establish clear, one-to-one associations of commonly occurring types of surface materials with all or part of the chronological span of the period.



A related problem is still more serious. For reasons discussed in the appendix to this chapter, I have not judged it possible in most cases to distinguish on the basis of surface collections between settlements occupied during the Third Dynasty of Ur and those of the succeeding Isin-Larsa period. Together, these span some 330 years. This is not in itself excessive, at least in terms of this study's emphasis on wide geographic coverage and hence rapidity of application. Included within the span, however, are three separate, successive political configurations organized around different capital cities. Almost certainly the rise and consolidation of each of these dynasties in its turn was accompanied by substantial shifts of population, in response to numerous changes and improvements in the canal system and the founding or relocation of towns. This being so, the totals given in table 13 to some extent conflate sequential developments during the Ur III–Isin-Larsa period, thereby considerably adding to the figures that are shown. There is no reason to doubt that the maximum extent of pre-Hellenistic settlement (and population) occurred during this period, as the table attests. But the magnitude of the difference between it and the preceding and following periods probably is less than the figures in the table suggest.

These and similar difficulties sharply restrict and qualify any demographic conclusions from the data of the survey. Yet it cannot be denied that there is a substantial, internally consistent mass of evidence from which we may draw some admittedly impressionistic generalizations. Broadly speaking, the population levels attained in the late Early Dynastic period seem to have continued until the last century or so of the third millennium. Internal shifts from district to district occurred during this span of almost a millennium, but there appears to have been little advance or decline in the regional aggregate. Then, within a relatively short period at the end of the millennium, there was a sharp increase in the numbers of sites in every size category. More attention will be given below to the meaning of this change for matters of subsistence, but it surely must imply a population maximum well above anything seen earlier. Thereafter the trend was irregularly, sometimes steeply, downward. By about the beginning of the first millennium B.C., there is a much smaller recorded aggregate of settlement area than for any period after the late fourth millennium.

✓ This account of demographic change, though internally consistent and supported by the available survey data, raises a number of problems when viewed in a wider context. Perhaps most important are the implications of the total occupied site areas given in table 13 for population and hence for the corresponding extent of cultivation, particularly as compared with the initial urban climax described in the preceding chapter. Recall that less than 600 hectares of site area was occupied during the Uruk period, and that even as late as the Early Dynastic I period

the total was only some 1,075 hectares. The latter figure was somewhat inflated by the great expansion of Uruk toward the end of Early Dynastic I times, moreover, since sequentially occupied areas could not be distinguished from simultaneously occupied ones. Yet by the end of the Early Dynastic period it is now suggested that the occupied area had climbed a further 54 percent over even the inflated figure. And the occupied area in the late third millennium, admittedly inflated by the same inability to distinguish between sequential and simultaneous occupations, is 153 percent above the Early Dynastic I figure. Is it reasonable to conclude that almost a fivefold growth in total population occurred, corresponding to the growth in occupied areas of archaeological sites, between late Uruk times and the Third Dynasty of Ur? Taking into account the deep, almost continuous, kaleidoscopic military and political shifts of this period of about a millennium, could there have been sufficiently high and sustained internal growth to account for an increase of this magnitude? Or do we need to conclude instead that there was extensive immigration?

Satisfactory answers to such questions are not easy. Much depends on the purportedly constant density of 125 persons per hectare of occupational debris (cf. chap. 3, n. 6), once again conceding that this or any such average masks a great deal of hitherto unexplained variance. But was the density the same for large as for small sites? If so—and the existing data do not really provide a basis for supposing otherwise (Kramer 1980)—it is difficult to contradict at least the main thrust of the quantitative comparisons just given.

A direct calculation of cultivated areas (on the basis of 1.5 hectares per person) is unreasonable, since for the late third millennium we are dealing only with assumed averages of size categories rather than with total measured areas. However, the approximate effect of an increase of this magnitude can be seen by referring once more to figure 24. The combined area of the two polygonal enclaves that are shown for the Early Dynastic I period would, if entirely shaded, be only insignificantly larger than the cultivated area needed to accommodate the late third millennium population whose cities and towns mostly occur in the same areas.

Such a reconstruction implies that there was a broad, contiguous zone of cultivation connecting most of the larger towns and city-states. However, that zone would have constituted only a relatively small fraction of the total alluvial land surface. Flanking it along both sides would have been substantially larger areas in which there was little if any sedentary population. Admittedly, no credible, comprehensive statements about population, with which we can check urban densities directly and hence substantiate this picture, have yet been encountered in ancient textual sources. However, the shift from separate "coronas" of cultivation around each major center

to a more fully integrated, zonal system is independently suggested by the evidence of irrigation nomenclature.

The importance of this evidence has recently been stressed by H. J. Nissen. He notes that none of the technical terms for irrigation facilities and their management and normal functioning (e.g., weir, settling basin, gate-house, offtake or inlet) appear in this context before late Early Dynastic times (Nissen 1976, p. 23; cf. Sauren 1966, pp. 35–83). Clearly this suggests a rapid technical development of irrigation works, connected with an equally substantial and rapid growth in their scale, concomitant with the growth of urban population that has been suggested. Precisely this kind of growth would have been needed if there were to be a transition from localized, ad hoc, generally small-scale irrigation concentrated along the back-slopes of particular natural levees to extensive, increasingly artificial, intercommunity systems. Probably present earlier, this tendency can best be seen in the survey data for the Ur III–Larsa period (fig. 31). Not only are extensive, dendritic systems of branching canals then in evidence, but there were even subsidiary canals paralleling the major channels (e.g., west of Adab) to link the upstream and downstream components of the system more firmly.

Also to be considered are the implications for urban population density of average house-plot size as suggested by real estate conveyances. A distinction from buildings with public or semipublic functions is not always easy to draw, but Gelb speaks of an “average” Old Babylonian private house as having been about 67 *gin*, or 39.4 square meters, in size (1976, p. 197). Following Russell (1958, p. 12), we may assume that a nuclear family of five is an ideal, not an average, and set the latter closer to 3.5. Assuming further that at most half of even a densely built-up area could be given over to actual living quarters, in order to allow for other kinds of construction and routes of access, densities of just under 450 persons per urban hectare are quite reasonable.

The difficulty is, of course, that the occurrence of such densities in some neighborhoods, and perhaps even in most districts given over to private housing, does not furnish a basis for extrapolating the population of entire cities. The Gilgamesh Epic speaks of Uruk, assuredly somewhat metaphorically, as having contained equal measures of orchards, clay pits, and city districts, as well as the temple precinct devoted to Istar (Chicago Assyrian Dictionary 1/1:380 s.v. *ālu*), suggesting that less than a third of the average for the built-up urban area as it existed at any given time would apply to the whole area of the city as an archaeologist would calculate it from surface data. Moreover, there were surely many special-purpose buildings other than temples within the actively occupied part of the city, including storage facilities, workshops, and provisions for temporarily accommodat-

ing herds and perhaps rural folk in times of crisis (e.g., Smith 1932, p. 297).

None of these countervailing considerations can be properly quantified, at least at the present stage of archaeological and textual study. But we cannot entirely exclude the troubling possibility that urban population densities sometimes were “only a small fraction of contemporary densities in villages and small towns” (Adams and Nissen 1972, p. 30). Perhaps significantly, it has been shown for one of the few adequate bodies of modern Middle Eastern materials relating density to settlement size that the same type of reduction occurs. In a group of fifty-four Khuzestan villages that all occupy less than 4 hectares, the average density of the smallest third exceeds that of the largest third by 68 percent—admittedly with much unexplained variance in each category (Wenke 1975–76, p. 90). However, one cannot reasonably extrapolate from modern landlord-controlled villages of a single type to ancient towns. Pending much larger exposures (or more systematic samples) in excavations, there is no basis for assuming that average densities often dropped below 125 persons per hectare in any of the larger centers, while in some of them it is quite possible that the average was a great deal higher.<sup>1</sup> Russell’s similar findings for medieval European cities (1972, p. 28) perhaps lend further support to this judgment. Let me conclude, then, by reaffirming that something on the order of a fivefold increase in population apparently took place over the millennium or so after late prehistoric times, with consequences for the irrigation regime that have already been noted.

Two other types of quantitative evidence potentially relevant to a determination of agricultural and population levels are to be found in the voluminous administrative records of the Third Dynasty of Ur (2111–2003 B.C.). The first concerns workers hired or assigned to assist in the harvest and other agricultural work in southern Mesopotamia; the second, receipts of sheep and wool at state intake depots like Puzrish-Dagan (or Sellush-Dagan). In both cases very large numbers are sometimes specified, the entire context of the recorded operations making clear that accurate counts rather than estimates or propagandistic statements were regarded as imperative. Neither type of information can directly furnish data on the total population of individual towns or even the region at large. But together they throw considerable light on overall patterns of land use and are of some assistance in establishing more securely the orders of magnitude for urban populations that have already been put forward.

Representative of one type of accounting for harvest workers is a text from Drehem (Puzrish-Dagan or Sellush-Dagan) that has been extensively discussed by Goetze (1963).<sup>2</sup> A total of 21,799 workers are listed, broken down into contingents under named captains from a number of towns and cities whose provincial rulers are

also named. Among the centers dealt with are several that can be definitely identified within the intensively surveyed region, including Umma with 2,600 *erén*, Adab with 1,800, Shuruppak with 1,200, and Isin with 180. The greater part of the group apparently was recruited from the region northwest of Nippur, extending as far as Sippar at the upper end of the alluvium but not including the lower Diyala plain across the Tigris.

✕ In a general way, the quotas assigned to particular cities correlate with the sizes attributed to those cities in table 14, on independent, archaeological grounds. The table places Umma and Adab in category 5, centering in the neighborhood of 100 hectares, and Shuruppak in category 3, centering at about 15 hectares. Isin is a special case since it is in the largest category only on the basis of the change in its fortunes after the Ur III period. At the time of this text, in the second year of Amar-Sin (2045–37 B.C.), it was apparently still of limited importance. To be sure, some of the men listed may come from towns and villages under the control of the same *ensi* rather than from the district capital where he exercised authority. But provisionally excluding this as a relatively minor correction, the two towns to which populations on the rough order of 10,000 have been attributed would have furnished something on the order of one-fifth of this number for agricultural work. Shuruppak, on the other hand, seems to have furnished a much higher proportion, suggesting either that the estimate of its size during this period is defective or that in this case it was expected to recruit heavily from subsidiary settlements near it.

Perhaps all that can be said is that there is nothing inherently unreasonable in the idea that one-fifth of the urban population was recruited for migratory but temporary harvest service. Excluding women and children, officials and other exempt categories, herdsman who could not leave their flocks, and surely some additional groups of adult males engaged in other essential services, an even higher proportion might have been available for a few weeks or even months without unduly straining the local economy. The total size of the work force is also not remarkable, at least when it is considered that the *erén* were drawn from the entire alluvial plain between the Tigris and Euphrates except for cities like Ur, Uruk, Larsa, and Lagash in the extreme south. To phrase these observations differently, even though the initial impression is that large numbers of men are dealt with, there is certainly not a convincing case that average densities in the larger cities needed to be any higher than 125 persons per hectare to provide them.

Goetze assumed that the entire group referred to in this text was assembled to assist in the harvest around Nippur, roughly in the center of the region from which the different contingents were drawn. But the distances are considerable: Sippar was about 135 kilometers north-

west and Umma about 85 kilometers southeast. If an allowance for travel time is made in addition to the time consumed by the harvest itself, the problem arises of how at least the more remote contingents could have coped with the harvest of their own fields. The spring harvest is the period of most intensive labor during the agricultural season (Adams 1965: pp. 14–15). Once the crop is ready its prompt completion is made urgent by heightening losses to pests in the increasingly intense heat of early summer and by unavoidable waste of grain when the stalks become too dry and brittle before being cut. Closely coinciding with the work in the fields, moreover, were equally urgent needs for large numbers of men to guard and repair the dikes and levees along the major watercourses lest large areas of standing crops be destroyed by the spring floods. For an especially crucial period of not less than several weeks in April and May, therefore, competitive demands for labor on state fields around Nippur and in the districts from which the workers were recruited would sharply scale down the proportion of the local population that could be enlisted for the purpose. Then our estimate of the density in the larger cities might need to rise accordingly.

There is an ordinarily unrecognized factor, however, that reduces or even eliminates the problem of simultaneous demands for harvest labor: the date of the harvest is not uniform throughout southern Iraq, but advances as one moves northward. Ancient records confirming this phenomenon are unfortunately not available, but there is no reason to believe that the sequence as outlined in figure 26 from modern Iraqi agricultural statistics is not a very close equivalent.

In light of the differences shown here, the work force probably was initially assembled in the southern part of the district and then moved northward, closer to the districts from which most of the men came, in time to participate in the harvest there also. Acting to lengthen further the available interval was the greater concentration of barley on the heavy, poorly drained and hence more saline soils of southern Iraq than in the northern part of the alluvium (Jacobsen 1958, pp. 12, 26–27), for even where the crops occurred in adjoining fields the traditional practice was to reap the barley before the wheat (El-Samarraie 1972, p. 62). That tradition can in fact be demonstrated in the modern statistical data as well, though for simplicity of presentation wheat and barley are combined in figure 26.

✕ How large an area could a group of about 22,000 individuals have been responsible for harvesting? The question is an important one if we are to reach some understanding of the importance of state-recruited and of locally employed agricultural labor. At least an indirect approach to an answer is provided by the Manishtushu obelisk, recording the sale of four large parcels of land to that king (ca. 2275–60 B.C.) of the Akkadian dynasty.

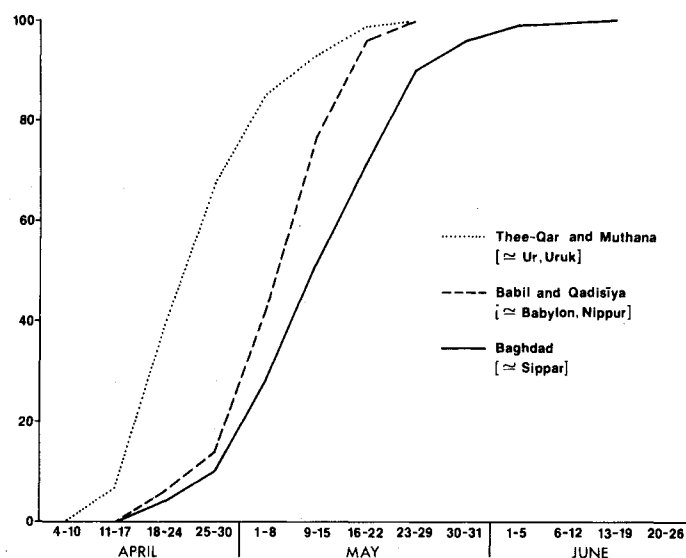


Fig. 26. Percentage of wheat-barley harvest completed at successive time intervals in five Iraqi provinces. From Department of Agricultural Statistics 1971, table 8: "Frequency Distribution of Harvesting Dates in the Selected Fields of Wheat and Barley, Based on the Sample Surveys Conducted in 1970."

The text speaks in aggregate of 964 guruš, "men" who presumably were the cultivators, who "eat bread" in a ceremony formalizing the sale of 9,643 iku, amounting to some 3,402 hectares (Gelb 1976, p. 199). The parcels that were sold surely included lands in their alternate year of fallow as well as the adjoining plots currently in cultivation. Insofar as this is a representative sample, therefore, the harvest-labor text records a group capable of dealing with about 3.53 hectares per person and hence with an area of about 770 square kilometers, although not much more than half of it would have been under cultivation in any given year. Some supporting evidence that a ratio of this magnitude is reasonably accurate is provided by the Iraqi agricultural and livestock census of 1952-53. For the four provinces of the time that together constituted the heart of ancient Sumer and Akkad (Baghdad, Hilla, Diwaniya, and Muntafiq) the average number of cultivated hectares (including lands in fallow) per agricultural worker was 3.24 (Principal Bureau of Statistics 1954, *passim*).

The territory for which these harvest-labor contingents had to assume responsibility thus was a substantial one. Some idea of its economic importance can be gained by considering dietary and crop-yield levels that were regarded as standard during the Ur III period. The average barley productivity as reckoned by scribes was 30 gur (-lugal) per bur, or 1,133.7 liters (about 700 kg) per hectare (Maekawa 1974, pp. 10-11).<sup>3</sup> The minimal yearly subsistence allowance, reckoned at 2 gur (Jones and Snyder 1961, p. 286), amounted to some 480 liters (or about 297 kg). Hence the crops harvested by these groups

would have been enough to provide for the basic sustenance of as many as 90,000 persons, equivalent to the total population of several of the most substantial cities of the time. Yet we know that Nippur, although presumably nearest at hand, was not among them, since it regularly received large deliveries of grain from other cities. The suspicion accordingly arises, although it cannot be confirmed with the available evidence, that the barley produced in this manner was only partly intended for the immediate subsistence needs of the urban population. Some of the harvest might have been diverted instead to export, for example, although only the Elamite plains around Susa and trading towns along the lower Gulf were within reach of economic shipborne transport. Beyond human consumption, however, lies the possibility that at least part of the barley may have been intended for animal fodder. This I will return to presently. In addition to harvest labor, there were direct and substantial bala contributions to the state from individual towns. In the case of Girsu (modern Telloh), about which we know most, the total area cultivated was about a third of that collectively harvested on behalf of the state as recorded in the text previously referred to. Half of the harvest was set aside to meet the costs of production, including rations for the agricultural workers and maintenance of the draft animals. The remainder was divided equally between the state and the priesthood, with the latter making provision for seeding, milling, and so on (Grégoire 1970, p. 233; Jones 1976, pp. 57, 60). In the absence of any reference to the recruitment of harvest laborers in Girsu for service elsewhere, it appears that in

the southern cities like Girsu that were nearest to Ur the emphasis was placed instead on direct grain deliveries of something on the order of one-fourth of the harvest. Perhaps the somewhat different emphasis in the central and northern part of the alluvium was partly a device by which to reduce transport costs, or at least to shift the burden of meeting them onto the shoulders of the producers. But it may also reflect the more sedentary, permanently urbanized character of the inhabitants of the southernmost districts.

The organization of agricultural work around the southern cities thus took a different form, although the heavy hand of state intervention is no less apparent. There are strong if indirect indications of fairly wealthy, powerful entrepreneurs, on the other hand, who assumed some of the responsibility for fixed deliveries from large-scale cultivation against advances of laborers and supplies (Jones and Snyder 1961, pp. 270–71). Daily allowances of wages, or less frequently rations, were the normal unit of account, and the figures are impressive even if the number of individuals simultaneously employed is usually difficult to establish. Texts from Girsu contain totals of 43,204 and 27,589 man- and woman-days of labor, for example, and a text from Umma dealing with women alone accounts for 93,781 full days' wages (Fish 1953, p. 49; 1956, p. 8). As this indicates, women were widely employed in agricultural operations as well as in crop transport associated with the harvest, although apparently not in the threshing itself. Their presence in such numbers may hint at a pervasive social difference from the northern part of the alluvium, although this might also result only from the migratory aspect of the harvest labor that happens to be recorded in the latter.

✕ It is interesting to speculate on where these large numbers of seasonal laborers could have come from. In a system of such rigorous state control as is usually pictured for southern Mesopotamia during the Ur III period, one would assume that most individuals were locked into position with prescribed if seasonally changing duties and with expectations of regular income from the state or a particular temple. Perhaps this suggests that there was a large, fairly fluid lower stratum of Sumerian urban society that otherwise receives little mention in temple or royal administrative records. Alternatively, we may catch a glimpse here of the limited, seasonal interaction of the state system with semisedentary folk who otherwise normally remained outside the perimeters of cultivation.<sup>4</sup>

What these texts dealing with cultivators suggest, in short, is the existence of a complex, geographically differentiated, and extensive system of agricultural management. Successive intervals of stable state control were by no means identical, but in all of them there appears to have been a fairly continuous band of cultivation that varied in width but extended down the center of the

alluvium for virtually its whole length, from Sippar to the head of the Gulf. Marked regional interdependence was a less constant feature, perhaps confined to the Ur III period. But at least at that time a disproportionate part of the migrant harvest labor supply was recruited from the generally more rural region of ancient Akkad, the upper part of the plain, and possibly from among semisedentary pastoralists not fully integrated within the state system. By contrast, there was a striking lack of participation by the inhabitants of the religious center of Nippur, consistent with its privileged status in numerous other respects (Cassin et al. 1965, p. 142). Other large southern cities, save perhaps Ur itself, received no similar dispensation. However, they seem to have been allowed to focus their agricultural activities on their immediate hinterlands.

This must partly reflect the concentration of power and wealth around the capital at Ur, in the extreme south. It implies sponsorship of a broad geographic division of labor in which trade and manufacturing as well as administrative and religious activities were disproportionately concentrated in the southern cities. The extent of cultivation around the latter thus ceased to be a function solely of their own immediate labor supply and food requirements, becoming partly also an index of the effectiveness of the regime in recruiting labor from remote rural areas. Against this background, cultivated areas and agricultural surpluses, like the population density in cities, were increasingly and intimately dependent upon the degree of political integration and the inward flow of resources that the center demanded from the kingdom's peripheries, rather than being relatively static reflections of the prevailing level of technology.

✕ Similar interpretations emerge from a consideration of the state-managed component of the pastoral economy during the Third Dynasty of Ur. Again the numbers are impressively large, attesting to what Kraus has appropriately called a "cortège ininterrompu" (1954, p. 528) of animals, principally sheep but also cattle in lesser numbers and occasionally even nondomesticated species, directed toward the larger temple establishments. For example, an aggregate total of almost 350,000 sheep and goats and somewhat less than a tenth of this number of cattle is recorded in one text, dating from the forty-eighth regnal year of Shulgi (2093–46 B.C.). Processed through Drehem, most of them were apparently intended for sacrifice during the preceding forty-nine-month period (Calvot 1969, pp. 103, 108–9, 113). To judge from contemporary Turkic nomads (Bates 1973, pp. 148–49), herds up to five times as large as the annual total of almost 85,000 sheep and goats per year would have been needed to sustain the flow of sacrificial animals alone. To be sure, by no means all of these animals necessarily were maintained within the Mesopotamian alluvium. It is known, in fact, that during the same period of Sulgi's

reign, several hundred fat-tailed or kungal sheep were obtained as "booty" from the land of Martu northeast of the Tigris, and others were shipped in the opposite direction (Lieberman 1968–69, p. 58). But there can be no question of the presence of very large, state-maintained herds both within the intensively irrigated belt along the central Euphrates branches and on the open steppelands surrounding it.

X The state's operations in connection with the production of textiles from the wool of its own herds were even more impressive. Jacobsen's fundamental study of the royal Wool Office speaks of an establishment charged with custody over some 6,435 tons of raw wool and employing as many as 9,000 state-owned male and female slaves. Its elaborate organization and record-keeping are not directly relevant to this study, but the overall scale is further suggested by the figure of about 2,000 tons of new wool coming in largely if not exclusively from the plucking of the royal herds (1953, pp. 172–74, 178). Figures are also available on the average annual yield per sheep, ranging from almost exactly a kilogram for the uli-gi variety that predominated around Drehem downward to about 0.707 kilogram of better-quality wool from the fat-tailed variety kept around Lagash (Waetzoldt 1972, pp. 5–6). If one assumes an average for all varieties of 0.85 kilogram, herds totaling more than 2,350,000 animals would have been necessary to provide the wool. These herds must have overlapped to some extent with the herds kept to supply meat and sacrificial animals, but it should be noted that several additional varieties of sheep are known that are seldom mentioned in connection with wool and so must have been kept primarily for these latter purposes.

As I noted earlier, not all of this immense number of sheep and goats at the disposal of the crown were dependent on pasturage and cultivated fodder from the Mesopotamian alluvium. Those designated as "highland" presumably took advantage of the richer grasslands in Rowton's "dimorphic zone" east of the Tigris. But such considerations as security, increased transport cost, and the barriers to efficient, centralized management arising from poor communications would have at least partly counterbalanced the attractions of underutilized pasturage there, in the calculus of a state bureaucracy intensely preoccupied with routinizing operations. Waetzoldt has shown, on the basis of recorded daily rates of plucking, that more than 200,000 sheep may have been processed each year at Girsu alone. Still other texts from Ur that record the receipt of new wool from fat-tailed sheep, the Lagash (and hence Girsu) variety, may attest the presence of as many as 500,000 sheep and goats in the Lagash area (Waetzoldt 1972, p. 14). This suggests that most of the royal herds were kept considerably closer at hand than in the natural grasslands of the Zagros foothills. Texts recording the feeding of barley to as many as 52,553

stalled sheep (and 1,522 cattle) at Girsu over a three-month period probably do not fully illustrate the extent of the practice even in that one center, and they certainly reinforce the conclusion that the distribution of the herds was heavily clustered within range of easy seasonal movement into the main settled areas (Schneider 1927).<sup>5</sup>

Returning once more to the Iraqi agricultural census of 1952–53, it is instructive to consider the number of sheep and goats then held within the four provinces more or less corresponding to the ancient heartland of alluvial settlement. At that time the total was 1,536,752, including just under 90 percent sheep and the remainder goats (Principal Bureau of Statistics 1954, *passim*). Even without considering herds kept especially for meat and sacrifice, the total during the Third Dynasty of Ur as hypothesized above was 53 percent greater. Making generous allowance for segments of the royal herds kept across the Tigris and elsewhere, does this imply an Ur III magnitude of land use very little different from that of modern Iraq?

To reach such a conclusion would require us to ignore the additional, surely very substantial number of animals that were privately or communally held by villagers and semisedentary folk. Their presence is only indirectly attested in state and temple records, for example by ex-voto offerings, but the patchwork of stubble and gleanings and other localized sources of fodder in rural areas afforded an ecological niche that only small herds in fragmented ownership could have filled, just as they do today. So a comparison of ancient with modern conditions must begin with the recognition that the ancient population of sheep and goats was considerably larger. Nor are the differences limited to this contrast alone.

The cultivated area in these four provinces at the time of the census was 16,800 square kilometers. This substantially coincides with the area blocked out by the lines of ancient settlement in figure 31, but the modern total makes no allowance for the many large areas of swamp and steppe that can be seen to have lain within the ancient perimeters. Also, the population in 1952–53 was reported to have included more than 518,000 men actively engaged in cultivating within these provinces, surely aggregating in the neighborhood of 2,000,000 persons with their families. To this total must be added the nonagricultural urban population of those engaged in secondary and tertiary occupations, not to speak of the considerable drain upon the countryside represented by the absentee landlords of the time with their retinues. It seems probable, in short, that no less than 2.5 million persons were sustained by the agricultural activity carried on within this area in the early 1950s.

No accurate estimate of the Ur III counterpart of this figure is possible, since only part of the total region has been intensively surveyed. But a reasonable extrapolation from the part that is known—even taking the Ur III figure of 2,725 hectares of settlement given in table 13

at full face value, without regard to considerations mentioned earlier suggesting that it is probably too high—is almost certainly less than three times this number, multiplied by an assumed density of 125 persons per hectare. The maximum population of the alluvium during the Third Dynasty of Ur was probably closer to a half million than to a million, in other words, and thus was less than a third of its modern counterpart. Seen in this light, the substantially reduced number of sheep and goats kept in modern times is even more sharply in contrast with the ancient pattern.

It seems inescapable that the ratio of sheep and goats to the human population was about four times greater during the Ur III period than it is today. This surprising conclusion has a number of further ramifications. To begin with, the contemporary pattern in which the bulk of the herds depend in the main on pasturage obtained within the perimeters of cultivation would not have been possible. Most of the herds instead must have spent most of the time on outlying steppelands and seasonally watered depressions, and the numbers are so large in relation to the subsistence potentialities of these types of terrain that many of the pastures were remote from the broad band of settlement and cultivation running down the center of the alluvium. An entirely different class of settlements thus was made necessary, as yet unattested in either the archaeological or the textual record, to provide temporary to semipermanent shelter for the herdsmen and perhaps their families.

It should not be assumed that these outlying regions were given over exclusively to herding, though this was surely the dominant economic activity. Nothing could be more natural than that some cultivation was added, wherever it was favored by a local source of irrigation water. Even minor cultivated plots would have improved the diet of specialized herdsmen and reduced the frequency of their visits to the distant towns along the major riverine arteries. Moreover, a local barley crop would provide supplementary fodder for the herds, permitting them to be enlarged without needing to move more often. A kind of semisedentary society thus would have been encouraged. It was organized around a few centers of administration and distribution, but on the whole it was composed of communities of very modest size and duration, thinly strung out along watercourses that more often were parts of a naturally anastomosing network of minor Euphrates offshoots than integrally planned components of an irrigation system. Something of this kind is suggested by an Ur III geographic text dealing with a district well to the west of the major line of Sumerian cities, centering on the towns of Kazallu and Marad (Kraus 1955). Marad, incidentally, was among the towns that furnished a contingent of harvest laborers in the text dealt with earlier, sending a substantial group of 1,510 that probably was recruited from the entire sur-

rounding district rather than from that fairly modest settlement alone.

There is a further ramification to these outlying fringe zones given over to predominantly pastoral semisedentary folk. Their initial formation must have been encouraged by the Ur III rulers in order to give proper care to the immense royal flocks of sheep and goats. As long as conditions of assured central control and political stability continued, herd maintenance offered no especially dangerous challenges and was merely one of a number of specialized activities carried on partly or largely in support of the state. To be sure, the size of the herds demanded an expansion in the pastoral component of the society, with several tens of thousands of individuals and their families assigned primarily to this service. As the powers of the ruling dynasty inevitably began to erode in conformity with the largely cyclical pattern suggested earlier, however, the attachment of outlying semisedentary elements would have been the first to loosen. Their largely pastoral basis conferred mobility, and mobility in turn conferred a greater opportunity either to shift loyalties to rival powers or to withhold support and tend toward greater degrees of independence and autarky. In other words, the formation of these impressive royal herds carried within it the seeds of a far-reaching dissolution of the web of political and economic interrelationships, once the initial organizing impulse had run its course.

We must also consider the meaning of the high ratio of the animal population to the human population for the subsistence base and major economic orientation of the metropolitan centers of the empire. Similar records are not available for other periods, but at least during the Third Dynasty of Ur there was clearly an exceptional royal emphasis on the production of wool and on the development of a large-scale textile industry. Woolen textiles, we may assume, were regarded as the basis for far-flung commercial relations with regions whose natural resources Mesopotamia altogether lacked. The well-being of the flocks was a major concern of state policy, therefore, and is likely to have exercised an influence on other aspects of agricultural policy, including crop preferences. X A profound change in crop preferences has been suggested on paleobotanical as well as textual grounds. There is some slight evidence for an almost equal balance of wheat and barley in the mid-fourth millennium (Jacobsen 1958, p. 50). By the end of the third millennium, southern Mesopotamia had unquestionably shifted to an overwhelming reliance on barley. Barley is more salt-tolerant, and it has plausibly been argued that the shift was primarily a consequence of ongoing processes of soil salinization that accompanied widespread irrigation agriculture (Jacobsen 1958, pp. 11–13; Jacobsen and Adams 1958, p. 1252). But barley is also the preeminent fodder crop for sheep, and both the size of the Ur III



herds and some direct testimony as to stall-feeding suggests the possibility that considerable barley may have been cultivated expressly for their maintenance. Without denying that salinization may also have played a significant part, we can thus suppose that the dominance of barley was partly a reflection of the commercial aspirations of the crown. The latter depended, after all, on maximizing the production of woolen textiles as the only valuable, lightweight, marketable commodity available in the kingdom's heartland with which to meet the needs of long-distance exchange.

This should not be taken to imply that royal policy favored the expansion of flocks while in any way opposing the growth of the human population. Mesopotamia was underpopulated in human terms as well, at least relative to the subsistence potentialities of irrigation agriculture during periods of stable, centralized authority. Hence the growth of the human population, and a concomitant extension of settlement and irrigation, was surely also a desideratum of state policy. It is known that Ur III rulers on occasion founded new towns, including at least one in the vicinity of Nippur, forcibly drawing in the conquered populations of more distant regions for this purpose. Agricultural pursuits and textile manufacture are specifically mentioned among the activities to which these settlements of prisoners were devoted (Gelb 1973, pp. 76, 82). The Third Dynasty of Ur foreshadowed the policies of the later Assyrian rulers in this respect, although markedly less persistently and on a less grandiose scale. But within the span of only a century or so before Ur's dynastic control began to crumble, its resettlement policies had not materially altered a balance weighted preponderantly toward flocks.

As briefly outlined above, the Third Dynasty of Ur provides a kind of paradigmatic model of maximization in Mesopotamian settlement and agriculture. Of course, state policies could proceed in the directions outlined only within the technological constraints of the late third millennium. Those policies were maintained with fairly consistent force and direction, moreover, only within the century or so of the dynasty's floruit. But subject to these qualifications, the economic achievements of the time suggest an ideal-typical model toward which other strong dynasties must have repeatedly sought to direct their energies.

This does not imply that the institutional patterns of the Ur III period were more or less consciously replicated at other times. In fact, the plane of abstraction maintained here has largely ignored specific institutional features. Only the existence of an absolutist state has been assumed, subject to more or less elastic principles of dynastic succession and to the inability of any dynasty to stabilize for long either its external frontiers or its internal authority.

Most of the discussion of early Mesopotamian history

has been conducted on a different plane of abstraction, concerned with the administrative and juridical particulars of a succession of societal and institutional forms that appear to have been more or less equally consistent with a larger framework of shifting dynastic authority. It has been traditionally maintained that the *Tempelwirtschaft* of Early Dynastic times (Deimel 1931; Falkenstein 1954) gave way to the state economy of the Third Dynasty of Ur (Kraus 1954), and that the latter afterward slowly came to terms with increasing aggregations of private wealth (Koschaker 1942). Diakonoff (1954) was the first to modify this view, showing that substantial communal holdings as well as large private estates existed alongside the lands administered by temples in the Early Dynastic period. Additional study of early land-sale records confirms not only the importance of private holdings but the diversity of professions represented among the sellers and purchasers. In retrospect, as Gelb (1969, pp. 139, 145) has argued, a sweepingly overgeneralized picture was reconstructed on the basis of a single archive. What faces the specialist now is the need somehow to strike a balance between accidents of discovery, different genres of material, and the few, generally ambiguous leads as to the relative strength or status of individuals and institutions. And at least equally demanding is the task of reconstructing a picture that clearly is no longer uniform but instead must take account of much local as well as temporal variability.

There is an identical need for the later third millennium. Arguments for a state economy were based largely on the absence of evidence for the private sale of land in archives that happened to deal largely or exclusively with state and temple activities. More recently, contemporary texts from Nippur that instead focus on private activities have begun to yield abundant evidence of a wide range of operations consistent only with private ownership of land in title as well as fact. To be sure, documents of sale are still not unambiguously attested. But Gelb has cogently argued that the available data are more consistent with an interpretation that the sale of property had been formally prohibited than with the absence of the institution of private land ownership (1969, pp. 146–51). There are even indications that kin-based or territorially based corporate groups continued through at least the Old Babylonian period as part of a mixed pattern of landholding (Yoffee 1977, p. 145) and in fact extended into the early first millennium (J. A. Brinkman, pers. comm.). What this suggests, as Maekawa (1973–74, p. 142) has noted, is that attempts to trace a line of essentially unilineal development (e.g., Diakonoff 1965; Adams 1966) generally overlook highly significant reversals, brakings, restorations, internal contradictions, and local differences in their search for a sweeping simplicity. But the even more important point is that a basic, continuously shifting pattern of economic differentiation and



centralization can be recognized behind the superstructural features and changes that have received greatest attention from the authorities in the field.

Among this underlying pattern's most salient features was the encouragement of an increase in population and an extension of settlement, increasing the human resources of the state vis-a-vis its competitors and enlarging its income from growing municipal and institutional transfers or taxes. Some natural demographic growth probably would result from the security afforded by a strong dynasty, but forced resettlement policies were also brought into play. A hierarchical, centralized structure is apparent in the economic spheres we have considered. This corresponds only in part with the development of a highly articulated urban hierarchy, for their advantages as defensive nuclei led to the differentially greater survival of large urban centers even under conditions of political disintegration. While there was evidently considerable expansion in the urban population, therefore, the more significant shift in settlement was toward a greatly expanded number of smaller villages along the dendritic elements of new (or reconstructed) irrigation systems. Like the canals themselves, many of these communities would remain viable only as long as the state was able to provide an outer envelope of security for them.

Accompanying the political and administrative centralization was an intensification of the dichotomy between an imperial core and its peripheries. The alluvial Mesopotamian plain in a purely spatial sense appears to constitute the central geographic region, but it was nevertheless sharply differentiated in functional and subsistence terms. Pastoral and semisedentary groups were allowed and even encouraged to occupy great zones of steppe and seasonal swamp outside the perimeters of cultivation, in order to maximize income from royal herds. Controlled by a painstakingly recorded chain of command so long as dynastic authority remained firm, these groups were of course especially prone to behave more independently under less rigidly authoritarian conditions.

Also under close royal supervision, and dependent on a continuing inward flow of resources from more peripheral components of the economy, was a manufacturing sector of impressive size and internal complexity. Secondary and tertiary occupations and professions were correspondingly numerous, including a substantial bureaucracy relying on exhaustively routinized accounting procedures. Patterns of final consumption are much less clear in existing documents, which concentrate on patterns of production and collection in central depots and attest to only the first links in the chains of dispersal, but clearly the system afforded the capability to sustain a substantial, even a preponderant, part of the adult, working population in the larger southern urban centers in nonsubsistence activities. And the system was also able

to generate a large supply of textiles, other craft products, and agricultural surpluses to employ in commercial ventures well beyond its own frontiers.

The human costs with which all this was accomplished were doubtless very heavy, but they are difficult to specify since they are generally ignored in the existing sources. Involuntary labor and forced transfers of agricultural and other surpluses must have been particularly onerous for primary agricultural producers, slaves in state facilities, and the lower levels of the social hierarchy more generally. Proportionately the largest part of the society, these groups had least to gain from the superimposition of dynastic authority. They benefited from the military security, to be sure, but increasing exactions probably offset much of this advantage. Hence it may well have been the massive human costs that in the end primarily accounted for the prevailing brittleness of periods of consolidation like the Third Dynasty of Ur.

There is a final respect in which policies of maximization apparently led to the gradual emergence of their antithesis. I noted earlier that late Early Dynastic crop yields averaged 2,030 liters per hectare, whereas under the Third Dynasty of Ur that impressively high figure fell sharply to 1,134 liters. In the meantime, seeding rates had had to climb just as steeply. "The rate most common and used over the largest area" in the Ur III period was 55.5 liters of seed per hectare (Jacobsen 1958, p. 63), more than twice the average rate at the end of the Early Dynastic period (see chap. 3, n. 8, and p. 87). As already observed in connection with shifts in crop preference, salinization seems to have been a major contributing factor in this ominous decline—in rate of return on seed even more than in output per unit of land area. But salinization is not an independent variable that is merely triggered by irrigation agriculture. Its onset and effects are inextricably intertwined with the intensity of land use and the irrigation practices that are followed. Hence I must mention once again the prodigious growth of population between Early Dynastic and Ur III times. Table 13 indicates a 64 percent increase in site area and implicitly in population, although part of this may stem from the conflation of Ur III and Isin-Larsa settlement patterns. Much of such an increase must have depended on extensions in the irrigation system and on an enlargement and stabilization of the supplies it could deliver to the cultivated areas it served.

Quite possibly the availability of water advanced to the point where in certain districts land rather than water placed the critical upper limit on production. In those circumstances there would have been a heavy inducement to maximize short-term output by cultivating the same fields every year. Widespread violations of the system of alternate years in fallow would have further intensified the salinity problem by doubling the rate of application of irrigation water, hastening the rise of saline ground-

water into the root zone. Probably the cultivators of the time perceived only imperfectly the relationship between overirrigation and the long-term loss of output to salinity. In any case, uncertainties as to the adequacy of the future stream discharge to meet the needs of the current harvest have always supported a practice of overirrigation. In the sequel, therefore, the Ur III agricultural regime provided both the inducement and the means to follow irrigation practices leading to an enormous loss of agricultural output.

Note that these involutory processes tended to be cumulative in their effects. Badly salinized lands frequently must have gone out of production almost indefinitely, for even in modern times their reclamation depends on slow, expensive, carefully controlled methods of deep drainage and flushing. Loss of formerly cultivated areas intensified the pressure on initially less affected districts and thus must have extended the problem. Serious as was the decline in average yields by the Ur III period, it subsequently went on to become almost catastrophic. Jacobsen has shown that by 1700 B.C., shortly before an extensive abandonment of southern Babylonia, yields around ancient Larsa had slipped to a mere 718 liters per hectare. Worse still, more than one-fourth of the area then in cultivation seemingly was being kept in production even though yields were only 370 liters (about 228 kg) per hectare (Jacobsen 1958, pp. 39–40). Since labor inputs were relatively inelastic, this represents less than a fifth of the expected yields eight hundred years earlier for a roughly similar magnitude of effort. The burden on the cultivator had become a crushing one.

Thus long-term agricultural decline was in some ways a direct consequence of its earlier apparent "success." As with the ineluctable political processes contributing the early demise of seemingly highly successful regimes like the Third Dynasty of Ur (above, pp. 132–33), this highlights the linkage between expansionist policies and ensuing collapse. Important features of both are to be understood only as parts of a single, long-term process. To that end, it may be useful to consider the nadir of settled life in the early first millennium B.C. as perhaps the sharpest imaginable contrast with the Ur III period. No comparable degree of detail is possible, since it is one of the characteristics of the time that textual sources were extremely impoverished. Administrative activity must have been at a very low level, apart from correspondence relating to the largely hostile and acquisitive interests of the Assyrians, and even archaeological testimony is very limited in extent. The contrast is thus particularly sharp with the Ur III period, the most voluminously documented of all from a textual standpoint. But enough is known to outline at least some of the generic features of the countryside. Together they suggest an opposite extreme, or at any rate a strikingly different paradigm, toward which the repeated oscillations away

from a condition of economic and political integration seem to have tended.

Figure 25 and table 13 illustrate the basic conditions of settlement in Middle Babylonian times, roughly the end of the second millennium B.C. and the first three centuries or so of the first. There had been more than a 40 percent reduction in the number of sites, and a 77 percent reduction in the aggregate occupied area, since the end of the Ur III period about a millennium earlier. Major urban centers had disappeared almost completely within the intensively surveyed region, although Babylon, the capital, was probably still of considerable size. Much of the population away from the district around Babylon may not have been sedentary enough to leave substantial archaeological traces, but almost two-thirds of the nucleated site area that presumably accommodated the fully sedentary component is composed of small villages and towns occupying 10 hectares or less. Accompanying this retrenchment, and making an analysis of it vastly more difficult, was an even more precipitate reduction in textual documentation. Accidents of discovery make the significance of direct comparisons somewhat questionable, but there are approximately seventy-five times as many Cassite texts as the 160 or so that are known for the post-Cassite or Middle Babylonian period (J.A. Brinkman, pers. comm.).

A decline of this magnitude cannot be thought of as a smooth, featureless withering away. Representing an antithesis to the unprecedented density and internal articulation achieved under the Third Dynasty of Ur, the new conditions must have led to a sharp deterioration in the fabric of urban as well as rural life. They even involve a steep retrogression from the preceding Cassite period, itself an interval of political retrenchment and demographic decline. Only a marginally greater area of total settlement appears to have been retained within the intensively surveyed region than in the Uruk period, two and a half millennia earlier, while already then, so soon after the very outset of settled life, the urbanized proportion of the population—not to speak of the vigor of cultural development—was appreciably greater.

With due allowances for fragmentary data, the social milieu of the time has been carefully pieced together by J. A. Brinkman (1968). He notes that urban life and culture continued, albeit on a declining scale and repeatedly subject to disastrous interruptions. The indigenous Babylonian population was concentrated in and immediately around the major towns, perhaps held in place by tenacious religious traditions and by the growing economic strength of temple complexes after an earlier nadir of corporate activity. Sargon's propagandistic inscriptions speak of freeing urban hostages from Chaldean detainment, and more generally of the pro-Assyrian loyalties of the citizenry of the larger towns. Largely on this basis, some have identified a shared Babylonian-Assyrian re-

ligious tradition and old cultural ties as a continuing historical force (Dietrich 1970, p. 5). Such loyalties may have played a part, and certainly the Assyrians lost no opportunity to reaffirm publicly their respect and support for the urban and religious institutions of their southern neighbors. But, as Brinkman shows, Babylonian urban allegiance to Assyria was at best qualified and subject to quick reversal. By the Assyrians' own accounts, the inhabitants of many Babylonian cities at least at times actively collaborated in armed resistance to the invading forces. Moreover, "there is no record of 'native Babylonians' or their cities revolting against Chaldean leaders, who must have caused considerable disruption by drawing down the frequent wrath of Assyria in the late eighth and seventh centuries" (Brinkman 1977, p. 315). At most, therefore, the relationship was one of shifting crosscurrents and conflicting loyalties. Perhaps the relatively less continuous and active opposition of the cities was largely a reflection of the fact that their citizenry were more immediately exposed to Assyrian retribution.

Assyrian kings boast of having reestablished urban lands and privileges, only to complain later that many of the same cities they had favored were actively supporting their former oppressors. Before the direct assumption of Assyrian imperial control, at least some acts of military intervention seem to have been intended primarily to provide assistance to the Babylonian king in his own unavailing attempts to impose order on the countryside. Adding to the complexity of the situation is that more consistent support for growing Assyrian suzerainty was evinced by southern than by northern Babylonian cities. Already for several centuries, the former had been little more than island enclaves in a Chaldean sea. Weaker urban adherence to Assyria in the north, by contrast, might have been an outgrowth of the more routine presence of Assyrians in administrative capacities there having brought palpably greater costs and fewer benefits. Rural Babylonian dependencies in the northern countryside generally seem to have remained under Assyrian control even when the cities there were in revolt (Brinkman 1965, p. 243; 1968, p. 229; 1969, pp. 346-47; pers. comm.). All this suggests that pro- and anti-Assyrian attitudes were probably less independently determinative than they would have appeared to the Assyrians. To some degree, positions on this issue appear to have been influenced by local cleavages between the towns and the countryside that sometimes extended into the towns themselves.

Our difficulty in weighing these possibilities, of course, is that so much of the available documentation stems either from the Assyrian state annals and correspondence or from the appeals of Babylonian partisans to what the latter must have hoped were Assyria's decisive interests. A spokesman for Nippur, for example, urgently requests the Assyrian king's assistance in the following terms:

The king knows well that people hate us everywhere on account of our allegiance to Assyria. We are not safe anywhere; wherever we might go we would be killed. People say: "Why did you submit to Assyria?" We have now locked our gates tight and do not even go out of town into the . . . We are (still) doing our duty for the king; the envoy and the officials whom the king has sent here have seen all this and can tell the king about it. But the king must not abandon us to the others! We have no water and are in danger of dying for lack of water. The king, your father, wanted to give us the water-rights for the Banītu-canal under this condition: "Dig an outlet from the Banītu-canal toward Nippur." [The . . .], however, refused us the water. The king should now send an order to Ubar, the commander of Babylon to grant us an outlet from the Banītu-canal so that we can drink water with them from it and not have to desert the king on account of lack of water. They must not say everywhere: "These are the inhabitants of Nippur who submitted to Assyria—and (when) they became sick and tired of the lack of water (they deserted)." [Oppenheim 1967, p. 175 (ABL 327)]

To what extent can we conclude, from self-interested testimony of this kind, that these protestations of Assyrian loyalty were genuine? Alternatively, the reality may have been that Nippur was indeed cut off and beleaguered in the midst of a hostile countryside, unable to muster sufficient forces to arrest the ruination of its own agriculture, and so pragmatically sought the assistance of its only potential ally. Essentially the same submission would have been made to the Assyrian overlord in either circumstance.

But let us turn from the cities, obviously circumscribed and largely powerless enclaves even though they naturally dominated in the loyalties and attention of the local scribal element. The countryside was largely in tribal hands, beyond the reach of urban administrators. Aramean-speaking groups, their members characterized by a gentilic adjective, had been longest in place but were on the whole most fragmented and least sedentary. There were thirty-six named tribes among them, some under the simultaneous leadership of as many as six shaykhs (*nasiku*). The Chaldeans, although more recent arrivals, were more centralized and hierarchically structured. There were only five relatively larger groupings, together constituting "the real strength in the land" virtually until the fall of Ninevah (Brinkman 1968, p. 318). Members of each Chaldean "house" claimed tribal affiliation by tracing their descent from its eponymous ancestor.

In addition, the Chaldeans in general seem to have been wealthier, more apt to be settled in their own fortified cities, taking an interest in trade, growing date palms, and playing an active role in the political life of Babylonia; also many Chaldeans, especially of the ruling families, took Babylonian personal names. The Arameans, on the other hand, seem rarely to have resided in large cities of

their own, appear more often as members of raiding parties, seldom had Babylonian names, and were not actively involved in Babylonian politics. [Brinkman 1977, p. 307]

It is difficult to establish the source or significance of these differences when so much of our present evidence consists of records intended for Assyrian use. Tribal groupings held a shifting mosaic of lands that interpenetrated with those of the Babylonians. The Chaldeans, in particular, maintained fairly continuous control of the southern Babylonian swamplands that were more remote from the Assyrians and more difficult to subdue militarily. The Bit Yakin tribe of the Chaldeans, for a time actively in alliance with Elam and the spirit of resistance to Assyria, had its strongholds there. Already by the mid-ninth century its shaykh was termed a "king" by the Assyrians. By the early eighth century the Assyrians spoke of the "kings of Chaldea" collectively, but to Tiglath-Pileser III a half-century later there were only "headmen." Succeeding variations in usage like these may attest either to the fluidity of local patterns of leadership or to Assyrian scribal uncertainties about unfamiliar customs and terms.

The Babylonians, Chaldeans, and Arameans clearly cannot be arranged along a smooth folk-urban continuum. There were sharp disjunctions, different directions of specialization, and probably historical reversals of direction as well. In general, however, the widest gulf seems to have been that between townsmen and countrymen. What distinguished the latter most visibly was that they tended to be tribally organized, and, as Morton Fried has persuasively argued (1968), tribal organization is perhaps in almost all circumstances to be understood as an outcome of the requirements of interaction with politically more developed neighbors.<sup>6</sup> At least for purposes of this discussion, similarities in the structural positions of the Chaldeans and Arameans outweigh their apparently different social bases and economic orientations. Both were largely nominal subjects of the Babylonian kings. Both were active in the resistance to Assyrian overlordship, with the Chaldeans in particular suffering massive losses of exiled population as a consequence. In spite of this, both were able for long periods to maintain considerable *de facto* internal autonomy.

The consistent resistance of the tribally organized part of the population to Assyrian pressure is striking. As a result of it, according to Assyrian claims, a total of more than 450,000 persons were forced into exile over little more than a forty-year period in the latter part of the eighth century. Even allowing for some duplication and a very large element of exaggeration, this surely testifies to the massiveness of an assault that was directed primarily against the Chaldean and Aramean countryside. According to Brinkman (1979, p. 235) it was "awesomely effective" in destroying the Bit Yakin, initially the spear-

head of resistance, as a military force large enough to be reckoned with. Yet the opposition of other, originally smaller groupings did not thereby slacken.

This resilience seems in partial contradiction to the relatively low population levels recorded for the intensively surveyed area, and it perhaps should serve as a warning against generalizations based exclusively on the latter. Part of the loss of population that is archaeologically attested even before the major Assyrian onslaught may have been more apparent than real, with most of the tribal elements occupying small, shifting settlements that produced very shallow accumulations of debris—and that hence easily elude archaeological detection. But even more important, the identification of the Bit Yakin with a swampy refuge and their close association with the Elamites suggests that they may have settled primarily in a region well to the east and southeast of the Babylonian cities along old Euphrates levees. Quite possibly this indicates a gradual retreat of the Gulf shoreline, creating an empty niche into which newly arriving tribesmen could readily filter. In these circumstances, the formation of a kind of no-man's-land within much of the area that heretofore has been archaeologically surveyed could well be a somewhat misleading indication of population trends for the Mesopotamian plain as a whole. A sufficiently large proportion of the alluvium has already been studied with the absolutely consistent finding of a drastic decline, however, to indicate that remaining regions are most likely to provide for more than a fairly modest reduction in the steep and widely prevailing loss.

In its general outlines, the picture outlined above is strikingly similar to conditions obtaining in southern Iraq during the last centuries of Ottoman rule (Adams and Nissen 1972, chap. 5) and to what little is known of earlier chaotic interludes like the Gutian period. Hence it is the generic features of political instability—the decline of irrigation agriculture, urban-rural polarization, and the heightened influence of tribally organized seminomadic elements—that must be seen as the cyclically opposed counterpart of periods of strong dynastic consolidation. The interplay of specific ethnic groups and cultural loyalties is not thereby made irrelevant. It may help to explain, for example, why tendencies toward integration as well as disintegration did not produce entirely uniform configurations with each rising and falling dynasty (Adams 1978). But the general pattern is most significant for an understanding of gross changes in settlement and land use. This is particularly true when so much of the evidence for those gross changes has had to be seen through the screen of roughly three-century spans into which the ceramic indicators were classified during archaeological surface reconnaissance. Conceding the historical imprecision of any schema that groups distinctive periods into contrastive categories, the oscillations in agricultural and settlement patterns for which evidence has been presented

in this chapter can therefore be viewed as forming parts of a grand, consistent pattern.

It is also true that during the course of the third, second, and early first millennia there were significant developments, whether abrupt or slow and cumulative, that cannot be subsumed within a pattern of oscillation between centralizing and disintegrating extremes. Emphasizing once more that this is primarily an account of land use and settlement, not of cultural or political history, I must now consider the most salient of these changes within the more particularistic or narrative framework of the succession of historic periods.

### THE SHIFTING NETWORK OF WATERCOURSES AND SETTLEMENTS

An overview of the main features of early historic settlement in the Mesopotamian plain, from Early Dynastic through Middle Babylonian times, is provided by figures 27 and 28. The first of these maps includes the Early Dynastic I period, thus maintaining a degree of overlap with figure 9 in which pre- and protohistoric sites concluding with the Early Dynastic I period were illustrated at the same scale. Similarly, settlements of the Third Dynasty of Ur and the Isin-Larsa periods (which it has not been possible to separate, as I noted above) form the concluding and beginning phases respectively in figures 27 and 28. It will be noted, however, that the second of these maps includes a somewhat larger region at a correspondingly smaller scale. This permits the area around ancient Ur to be included, as separately described in an appendix to this book by Henry T. Wright on the basis of his 1966 survey. Also shown only in figure 28 are the major centers in the ancient kingdom of Lagash whose locations are known—Girsu, Nina, and Lagash itself. Figure 28 is an essentially complete map, in other words, of all known Sumero-Akkadian sites on the alluvial plain between the Tigris and Euphrates from Ur III times onward.

A greater density of sites is apparent in the southeastern half of both maps, the region of more intensive archaeological survey. The average interval between sites is, correspondingly, several times greater in ancient Akkad, the region to the northwest. However, this is not a genuine regional contrast. It partly stems from differences in reconnaissance methodology, as well as reflecting the greater depth of alluvial deposition and the much more extensive disturbances resulting from modern cultivation that are found in the upper part of the plain. The relatively limited effect of the latter two factors on the lower plain has encouraged more detailed treatment of ancient watercourses there, as described more fully in chapter 2.

Relatively straight dashed lines between sites, to be noted primarily in Akkad, are no more than generalized suggestions of the paths the major watercourses of the time may have taken. In Sumer, on the other hand, it has

been possible in many cases to trace actual paths, complete with meanders and meander cutoffs, with the aid of air photographs. Once again, this contrast must not be regarded as indicating a genuine regional difference. There is nothing to imply that straight, essentially artificial canals were characteristic of the upper part of the plain, or that state engineers and cultivators in the lower part were content with more "natural" river regimes. If anything, the opposite is likely. Straightening and diking were probably commoner in the more urbanized, and almost certainly more densely populated, southeastern region of ancient Sumer than in Akkad.

The main modern branches of the Euphrates, shown in both figures, are far to the west of their ancient counterparts. Parts of the modern river regime are so linear as to imply that they follow earlier courses laid out for artificial canals, as for example northwest of ancient Borsippa. But the irregularity of most of the rest of the system is striking. There are abrupt changes in direction even apart from numerous meanders, and the prevailing pattern (somewhat simplified in these maps) is one of repeatedly bifurcating and rejoining channels. Some areas are inevitably more suitable than others for irrigation and settlement within a prevailingly "natural" riverine system of this kind. The modern population, therefore, tends to be grouped in irregular clusters, especially where local conditions permit dendritic systems of canals to fan out into adjacent hinterlands, separated by thinly populated reaches of swamp or by uncultivated steppe.

Essentially the same pattern will be observed in the better-known, southeastern part of the ancient series of Euphrates branches. Continuous, fairly regular distributions of contemporary archaeological sites can be followed along a few channels there, but it is more common for groups of sites to be interspersed with areas apparently lacking permanent settlement. Hence there is almost always some degree of ambiguity as to which apparent segment of a line of settlement along an ancient watercourse was connected with which other upstream or downstream segment. During the periods dealt with in this chapter, in other words, the uniformity that might be expected of the ancient riverine system and adjoining chains of settlement as a result of comprehensive planning and regionwide improvements is not in evidence. With few and apparently brief exceptions, the local district rather than the region as a whole seems to have been the basis for the design and maintenance of the canal irrigation and transport system. The main channels themselves accordingly were for the most part closer to the "natural" than to the "artificial" end of the continuum.

The massive westward movement evident in the present position of the Euphrates can be partly documented from the sequence of the two figures. By the time of the second, there had been some westward movement in the center of gravity of settlement. This was particularly the

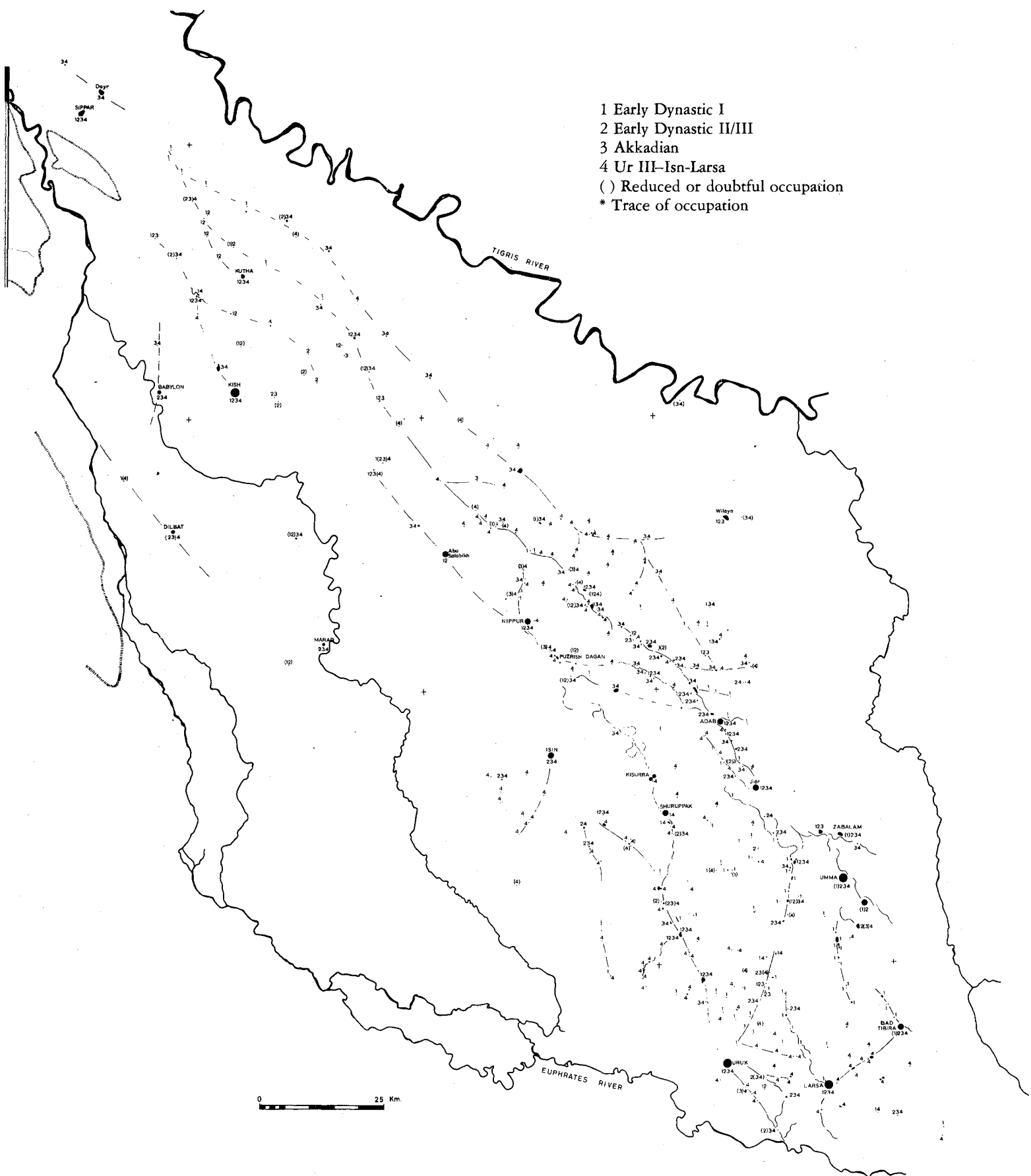


Fig. 27. Sites and watercourses of the third millennium B.C. on the Mesopotamian plain.

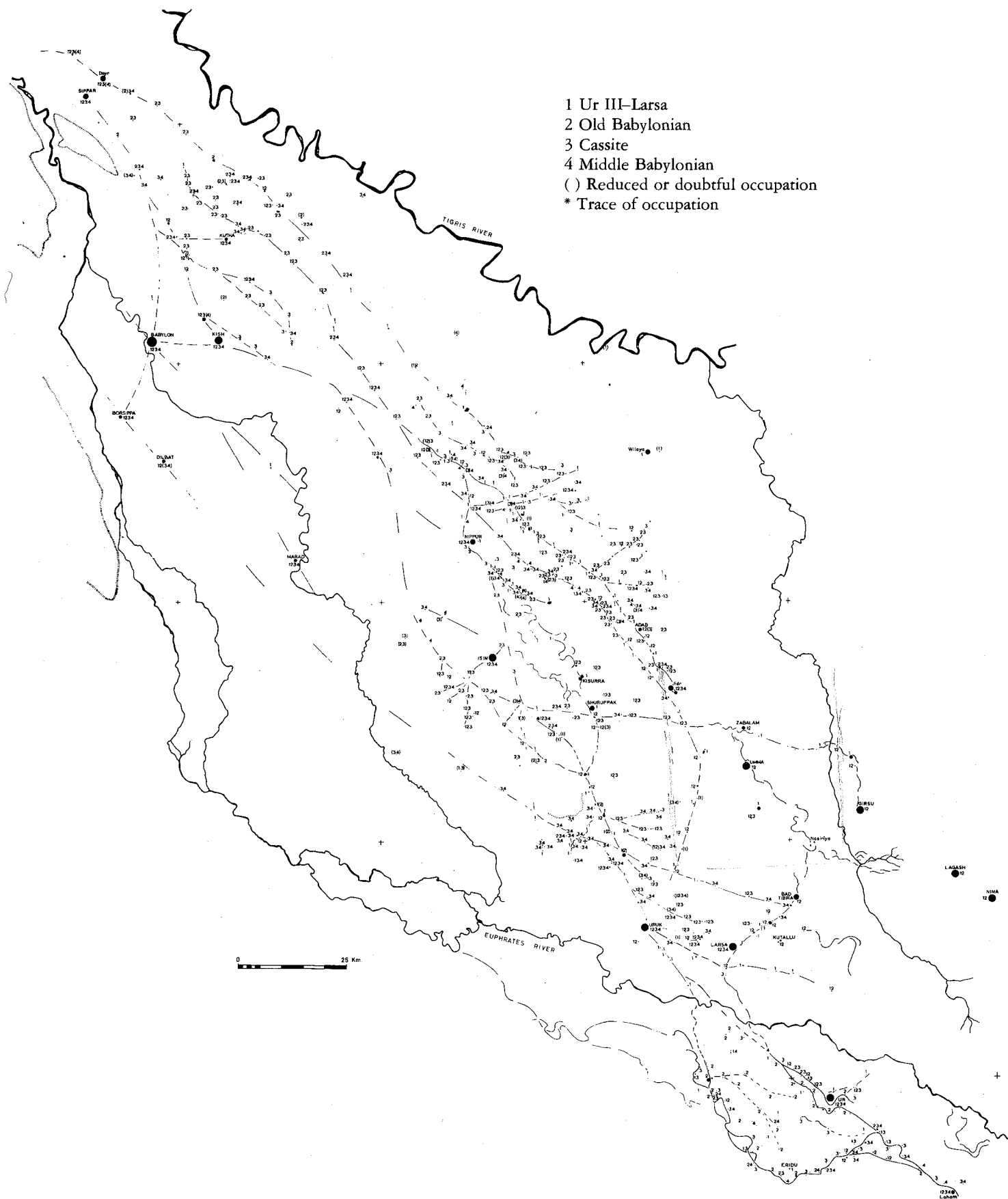


Fig. 28. Sites and watercourses of the late third, second, and early first millennia B.C. on the Mesopotamian plain.

case to the west and south of ancient Isin. The westward movement of power and population from Kish to Babylon as the major northern city additionally must imply a shift of the same kind in Akkad. Babylon lies alongside the Hilla branch of the present Euphrates, the more easterly of the river's two main beds, but among other ancient towns of any importance only Borsippa, Dilbat, Marad, and perhaps Kazallu can be located near or between the Hilla and Hindiya branches of today. To judge from limited and problematical surface collections, none except Babylon were of major size or more than local influence within the long span of time covered in this chapter. Tentatively, therefore, the shift appears to be of later date. Considered in the abstract, site distributions as reflected in these figures seem to indicate that most of the Euphrates, or at any rate the main flow that was utilizable for irrigation, continued down from the center of the alluvium and past all the major Sumero-Akkadian cities.

On closer inspection, however, the sequence of figures 27 and 28 supports a somewhat different conclusion. The general direction of flow of virtually all the major watercourses in the third millennium was in roughly parallel lines from the north-northwest, conforming to the slope of the alluvium itself. The pattern was more complicated in central and southern Sumer, to be sure, but this southeastern region was one of minimal slope. As I have noted, moreover, it was the most heavily urbanized part of the country. Many of the canal lines shown in figure 27 that fail to take the prevailing direction can be thought of as radiating from or converging on individual cities.

In figure 28, on the other hand, we can see a number of elements of a radically different pattern. Beginning in the second millennium, the older channels were supplemented by new ones crossing the plain from the west-northwest. These serve many of the same cities that had been located originally along the north-northwest channels, but they do so by following the plain's contours perpendicular to its slope or by cutting diagonally across those contours. Here we are clearly dealing with canals that must have been largely artificial in their construction, even though some are apparently more than 100 kilometers long and must have been correspondingly large in capacity. The obvious explanation is that they were designed to tap a greatly increased proportion of the Euphrates flow that now was finding its way down the more westerly of its channels rather than down the center of the alluvium.

Associated with that shift in flow must have been an unprecedented degree of waterlogging of the western part of the alluvium. The formation of large, relatively permanent swamps and lagoons would have increased the isolation and hence the autonomy of the region, as well as increased the difficulties of constructing canals to transfer water eastward across it. Some insight into the contemporary character of the countryside is perhaps offered by a shallow lake bottom covering more than 100

square kilometers, now only periodically submerged and generally dry but thickly strewn with shells, whose origins may well go back to the mid-second millennium (see site 1572 in the general site catalog).

Striking as they undoubtedly are, these changes need not be thought of as a full and irrevocable replacement of one system by another. The lesser slope of the increasingly artificial canals would have increased their tendency to accumulate silt, making the older levees more attractive conduits for irrigation water at least in terms of requiring a smaller labor input for maintenance on the part of downstream users. If there were accidental or politically motivated diversions upstream, however, the new canals would still permit life to continue in the ancient cities in the center of the plain. The actual amount of water that shifted to the more westerly Euphrates channels is thus difficult to gauge. An irregular series of movements followed by partial corrections is likely, such that massive new irrigation works had to be constructed if the southern cities were to guard against the catastrophic loss of irrigation agriculture, their primary basis of subsistence. But the proportion of water flowing in the various channels at any one time must have varied in accordance with a host of local factors, and the westward movement of the Euphrates probably should be seen as a long-term "process" rather than a single "event."

The position of the Tigris is considerably more obscure than that of the Euphrates. Even Akshak, probably the most substantial of the ancient towns along or in the vicinity of the Tigris, has not yet been positively located. In fact, not a single settlement on the alluvium identified with the Tigris in pre-Hellenistic times can be identified that would permit the location of any part of the Tigris bed (or beds) to be specified. The hydrological background for this unsatisfactory state of affairs has been described earlier (see above, pp. 6-7), and here I need only note once more that in any case there was no band of dense cultivation and urban settlement along the Tigris comparable to what existed along several Euphrates branches. As I also noted earlier, however, the apparent prehistoric confluence of the Tigris and Euphrates near the upper end of the alluvium was not necessarily followed by an early, complete, abrupt separation of the two rivers (see above, pp. 16-18). In addition to a branch somewhere in the vicinity of the modern Tigris, some Tigris water may at least periodically have joined with what have been described as "Euphrates" branches flowing nearer the center of the alluvium. The final separation might well have occurred in connection with the westward movement of the Euphrates just referred to, in the second millennium.

The important ancient mound now known as Tell al-Wilaya has some bearing on the probable course of the ancient Tigris. As I noted earlier, Postgate has plausibly, if still not conclusively, identified the site with the city of



Kesh. If the identification is correct, Postgate observes, "the 'Kesh-river' would almost certainly have been a branch of the Tigris, and so Kesh would have lain on a line of communication by which the cities of southern Sumer were connected with the Tigris, Aksak and other towns of the Diyala group" (1976, p. 80). Wilaya's position, somewhat detached from all the centrally located watercourses and markedly closer to the Tigris, clearly supports this speculation. A site of its size could not have existed in isolation from some substantial source of water, and the Tigris is by all odds the most likely. But it is to be regretted that the admittedly limited survey coverage in its vicinity has failed to reveal a suggestive line of neighboring settlements from which either the Tigris course or that of the "Kesh-river" leading from it might be inferred.

The Sumerian antecedent for the name Tigris is Idigina (Akkadian Idiglat), but its geographical application is somewhat obscure during the periods we are concerned with here. Edzard and Farber identify the name as used in Ur III economic documents with a canal flowing along the approximate line of the present Shatt al-Gharraf, which runs southward from its offtake above a weir near Kut, while literary references seem to apply to a watercourse farther east (1974, p. 269). Numerous references to work done along the Idigina banks or at the Idigina River also are found in the economic texts from Umma (J. W. Turner, pers. comm.). This strongly suggests that territories administered from Umma extended northward to the Tigris, and it at least implies that during the Third Dynasty of Ur the northern hinterlands of the city were watered in part by feeder canals from the Tigris.

✕ In earlier times references to the Idigina converge on a canal situated along the eastern frontier of the kingdom of Lagash, hence well to the east of the modern Shatt al-Gharraf and beyond the range of survey coverage (Edzard, Farber, and Sollberger 1977, p. 217). A suggestive beginning has been made at locating the position of one or another of the watercourses to which the name refers with the aid of archaeological survey techniques (Jacobsen 1969, p. 105), but full resolution of the problem will require much further work in a still essentially uncharted area. It is apparent once again that a watercourse existed somewhere to the north, whence irrigation supplies could be brought by canal into the region of Lagash, Larsa, and other southern cities, but as yet there is no basis for deciding whether to place it in the latitude of Wilaya, in the vicinity of the present Tigris bed, or perhaps still farther north (Adams 1965, p. 41).

In Cassite times there is a tantalizingly unspecific reference to Tigris water being introduced by canal into the Nippur region. A letter found at Nippur, probably a copy of one sent to the king by an official stationed there in the thirteenth to fourteenth centuries B.C., suggests that the latter "would even dig out the *namgāru*-canal from the Tigris" to provide water for certain date palms (Biggs

1965, p. 97). A glance at the distribution of Cassite settlements in the district for which Nippur is likely to have been administratively responsible (fig. 34) indicates several possibilities for this canal to the east and east-northeast of the city. But the wording of the message implies a watercourse that was in at best intermittent use. Moreover, the suggested course of the canal emanates from the general vicinity of Tell al-Wilaya, by then long abandoned. If anything approaching contemporary conditions along the nearest portion of the Tigris bed obtained at the time, waters withdrawn along the suggested course would have needed to be brought up from the deep Tigris bed through the use of lifting devices (Biggs 1965, p. 102).

Similar ambiguities surround the naming of the "Euphrates" branches in the center of the alluvium, even though in this case we can follow at least portions of their courses in considerable detail. The essential difficulty is one that Nissen (1976, p. 13) has adumbrated, that the adjacent position of a particular watercourse and a particular town was self-evident to a scribe of the time and hence was almost always omitted from the texts as redundant information. It is evident that there was a westerly branch of initially limited importance, even though its identification with the present Shatt al-Hindiya is perhaps somewhat too facile. This is the Abgal of the Akkadian period and perhaps earlier, becoming in time the Palukatu and ultimately the Pallakottas that was familiar to the Romans. The name probably survives today in the town of Falluja. Farther east lay the Arahtum, along a course southward from Sippar through Babylon, Dilbat, and Marad and thence perhaps toward either Isin or Uruk. Beyond it lay the most important early bed, in historical if not necessarily in hydrological terms. Named Buranuna (Akkadian Purattu), from which the word for Euphrates is derived, it seems to have flowed at one time through Sippar, Kish, Nippur, and Shuruppak to Uruk and thence to Ur. Much less certain is the identification of a still more easterly branch as the Zubi. It is also a matter of dispute whether a major channel connecting Adab, Umma, and Bad Tibira with Larsa, below which it apparently bifurcated into branches flowing toward Larsa and Lagash, was ever generally referred to as the Iturungal. Whatever its name, however, it must have derived at least in part from one or more easterly branches of the Euphrates farther upstream—possibly the Buranuna, possibly the Zubi. Adding further confusion to this highly uncertain picture is the fact that many parts of the entire system were frequently referred to merely as the "Sippar River" (Edzard and Farber 1974; Edzard, Farber, and Sollberger 1977, passim; Adams and Nissen 1972, pp. 42–47; Jacobsen 1960).

Little is to be gained by attempting to specify the location of smaller named components of the system, of which there are many, when even the major channels present such difficulty. The reconstructions of watercourses

shown in figures 27 and 28 have not been derived from textual considerations at all. Instead, they are based on suggestive lines of contemporaneous archaeological sites, sometimes adjoining ancient stream or levee traces that can be seen in the air photographs or in the LANDSAT imagery. It should be kept in mind that the watercourse routes thus reconstructed in no sense exhaust the possibilities even for the major channels. This is especially so since the two maps cover a span of some two and a half millennia of repeated modifications, reconstructions, and naturally induced changes.

If we assume that the canal running through Marad was the Arahtum, for example, the name may have been applied to a series of widely divergent alternative routes below the town as particular channels silted up, were abandoned, and ultimately were replaced by new ones. The only levee that can be detected in the satellite imagery in this case seems to be directed toward Uruk and Larsa, but it seems very likely that a branch, and perhaps even the entire flow of this channel, was diverted instead to Isin during periods of that city's hegemony as a capital. If so, it would be fairly natural for the name to be transferred along with the water. Still later, Edzard and Farber suggest that with the drying up of the former channel farther east known as the Buranuna this name was transferred to the Arahtum (1974, p. 272).

In other words, there is every reason to expect that nomenclature was as flexible in its application to the entire network of streams and canals as the latter was continually changing. This sharply limits the utility of the texts for reconstructing not only the canal system but the adjoining settlement patterns, not to speak of the subtle and pervasive changes both underwent. Written records provide a picture that is tantalizingly detailed for limited periods and areas, to be sure, as is especially well illustrated in the kingdom of Lagash (Falkenstein 1966, pp. 17–41). But until excavations have made it possible to identify firmly far larger numbers of small as well as large sites, the picture provided by the texts is also on the whole exceedingly fragmentary. Most significantly, there are virtually no secure geographic reference points except for a handful of the major cities. It is in the light of these deficiencies that we should now turn to the far more limited and superficial—but also far more systematic and “complete”—data of archaeological surface reconnaissance within the intensively surveyed region.

Figure 29 illustrates the late Early Dynastic distribution of sites, to be directly compared with figure 21, in which the identical region is mapped for the Early Dynastic I period. A series of striking changes apparently had occurred during the intervening interval, most notably the extensive abandonment of scores of smaller, outlying settlements away from the major watercourses. Perhaps one can speak of “linearization” of the pattern, with ribbons of close-spaced towns (and presumably adjacent strips of

cultivation) replacing a looser and much less dense arrangement in which there had been many minor effluents and small, disarticulated clusterings. The Early Dynastic I map suggests a mosaic of small, adjacent patches of steppe, swamp, and differentiated cultivation. By the Early Dynastic III period the patches had coalesced into much larger, probably more contrastive, bands and zones. Just as most of the villages in Uruk's protohistoric hinterlands disappeared, their inhabitants drawn into the city, so there was an emptying of the outlying terrain around more northerly cities like Adab and Nippur. Perhaps the largest single movement involved the abandonment of a series of sites south of Umma, a number of them of urban proportions. Some of the population of this district was drawn off southeast, into Bad Tibira, but the greater part is more likely to have contributed to the rapid growth in the political importance of Umma that took place in the late Early Dynastic period.

There is a perceptible increase in the density and extent of settlement along the more easterly of the two main watercourses shown in these maps. This finds direct expression in the size and distribution of sites along the line running from above Adab to below Umma, and perhaps also in the leading political roles played by Umma and its downstream competitor Lagash, in late Early Dynastic times. But it is also noteworthy that there is little if any further growth at the same time along the Shuruppak-Uruk watercourse, in spite of the 54 percent expansion in settlement for the region as a whole that was reported earlier (table 13). If suggestions of a possible steep decline in Uruk's population are taken seriously (see above, p. 132), it even appears that the Adab and Umma districts may have grown directly at the expense of the districts between Shuruppak and Uruk. And it is noteworthy that a canal leading from just above Umma (site 175) in the direction of Uruk apparently came into greater prominence as the Early Dynastic period continued. This invites the speculation that water shortages were being felt in the Uruk area, while there must have been supplies to spare on the Umma channel, since otherwise the forces of Umma were easily in position to prevent such a diversion.

Ø The Akkadian period, shown in figure 30, further accentuates the shift of settlement away from the Shuruppak-Uruk channel. Occupation at both of those ancient cities was severely limited, if indeed they were not largely (if only temporarily) abandoned. Similarly, the reoccupation of an abandoned prehistoric town (site 1237) southeast of Nippur hints at the possibility that water in the Nippur channel was now being diverted toward Adab, rather than being allowed to maintain its former direction toward Shuruppak. The Adab region thus became particularly densely occupied, and it is arguably the largest urban concentration yet known within the Old Akkadian realm. Attention should be called to site 1188, among several others of apparently urban dimensions. With the provision-

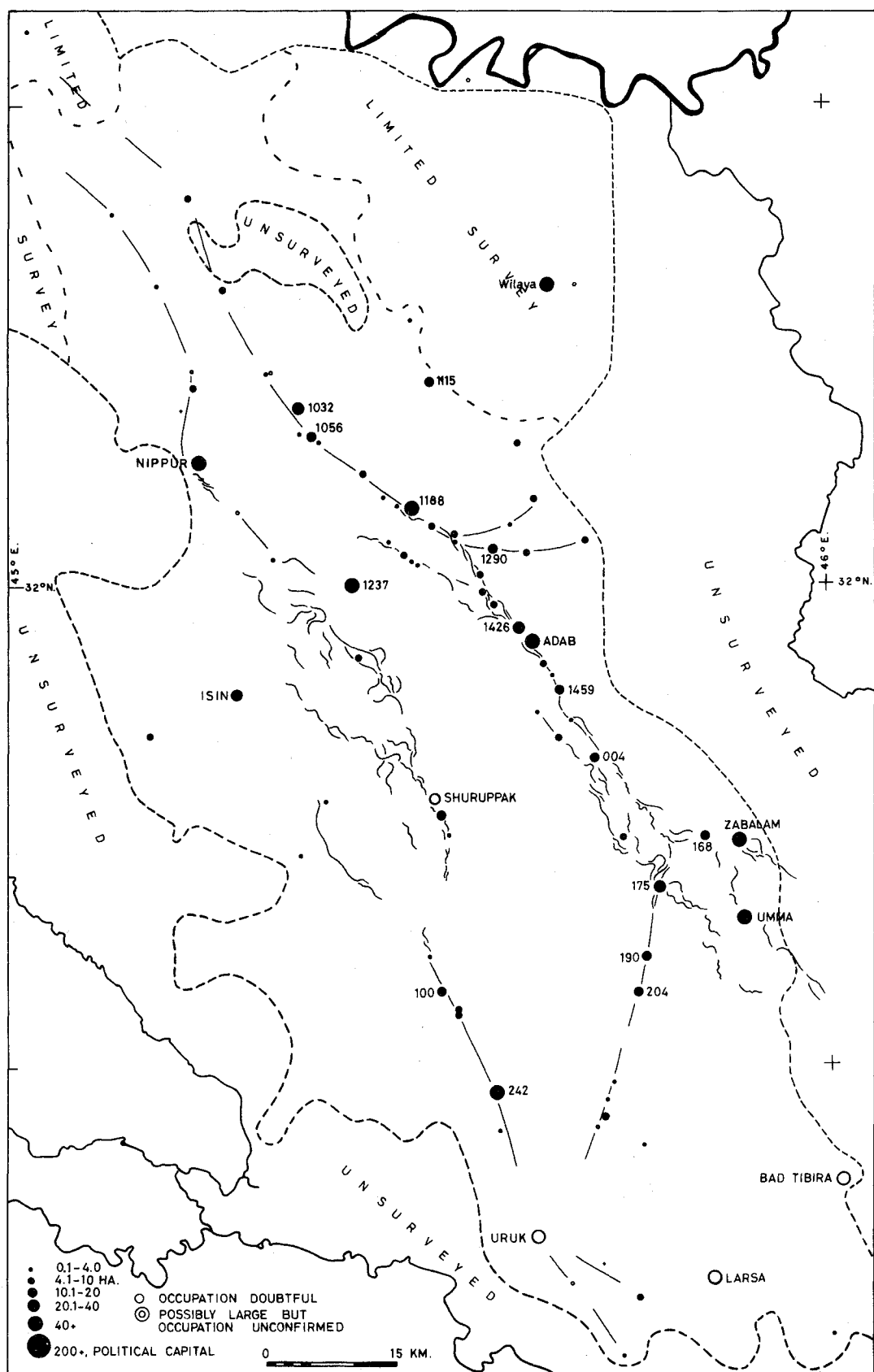


Fig. 29. Late Early Dynastic period settlement patterns.

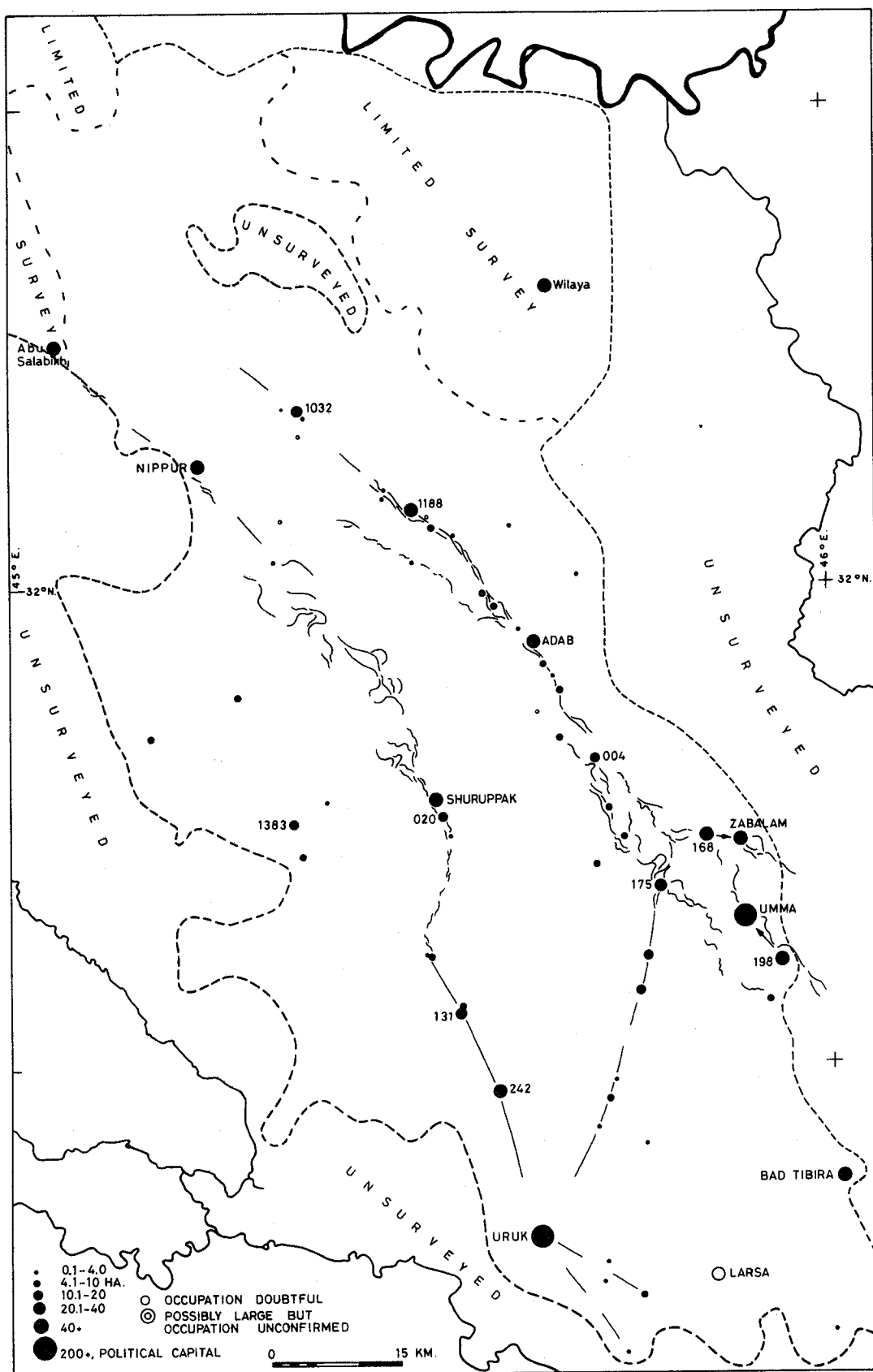


Fig. 30. Akkadian period settlement patterns.

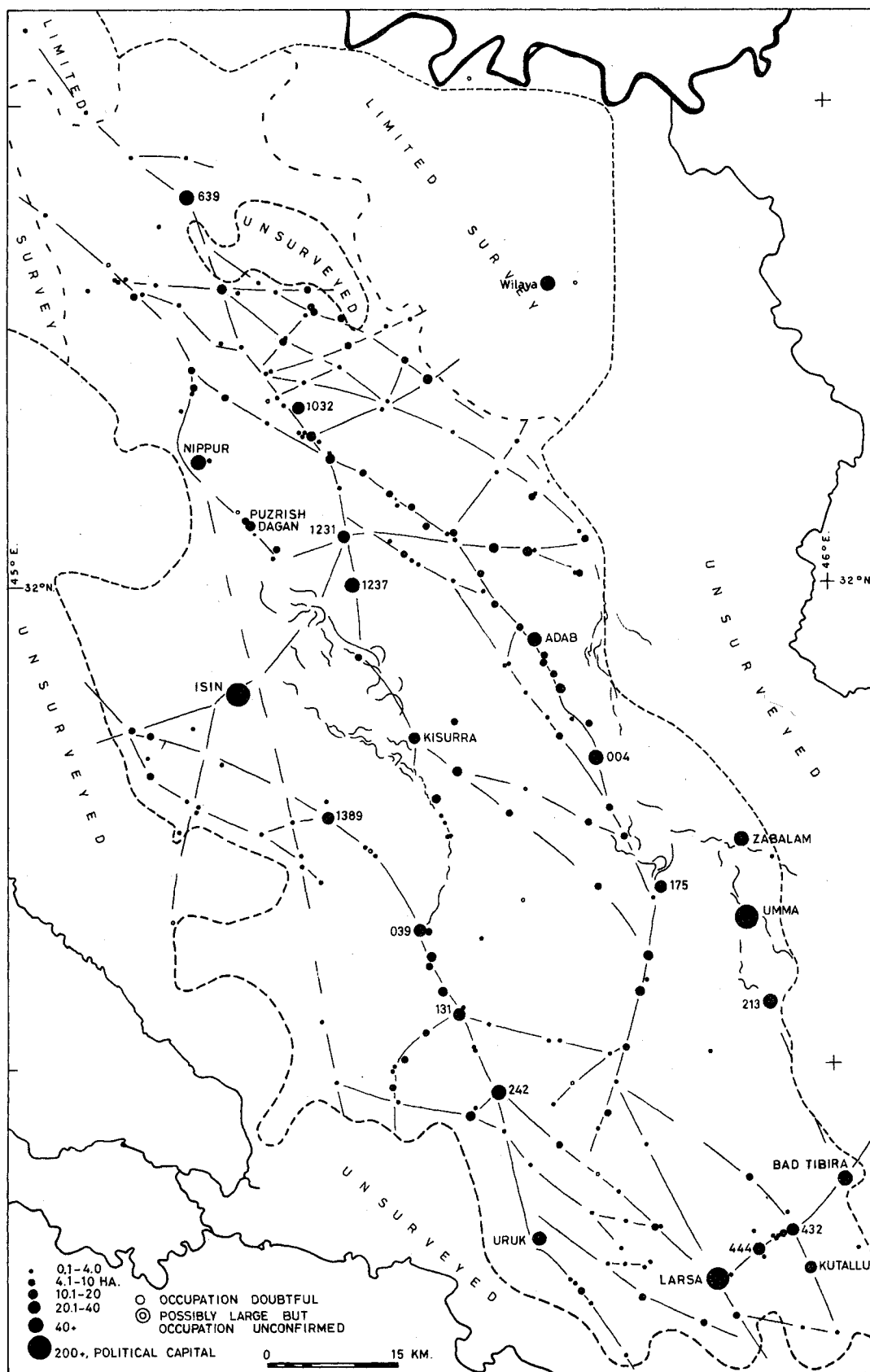


Fig. 31. Ur III-Isin-Larsa period settlement patterns.

ally assigned name of Tell al-Hafriyat (descriptive of the extensive illicit digging there), it has become the focus of a program of scientific excavations by the Oriental Institute under the directorship of McGuire Gibson.

Of special significance as an indicator of growth is the appearance of a dendritic fan of canals or river effluents north of Adab and east of site 1188. This suggests the introduction of a zonal irrigation system on at least a local scale, as opposed to the confinement of irrigation to the backslopes of the main levee. In one sense this represents the modest beginnings of a reversal of the trend toward hypertrophic urbanization that had culminated in the late Early Dynastic period. But the reoccupation of formerly settled districts probably was now on the basis of artificial canalization under the aegis of a victorious dynasty with new resources of wealth and labor to deploy, rather than along small, insequent streams of a prevailingly natural character.

With the advent of the Third Dynasty of Ur, large-scale canal systems of this new kind quickly reached a peak of development. The increasing linearity of most of the main channels is clear in figure 31 from the regular positioning of adjacent sites, as well as from numerous surviving traces of levees (many of them repeatedly reutilized in later periods). Around Adab the relationship of settlements to the watercourse on which they depended is especially well highlighted, largely as a result of the extremely rapid surface erosion going on in the area owing to the presence of a heavy belt of dunes (fig. 32). Adab and its dependencies as they may be seen here probably were already flourishing before the Ur III period, but at least the smaller towns are likely to have reached their maximum size at this time. Adab itself, on a substantially elevated mound, would have been visible from a great distance. From each of the fairly substantial towns strung out along the main watercourse below it, however, several other towns and villages would have been within easy visibility of an observer of the time. And the watercourse, whether it is thought of as a "river" or a "canal," was certainly of impressive proportions. While there are some deviations from linearity in its course, they are extremely modest in relation to its apparent width. Its propensity to develop meanders was natural and could not be entirely prevented, but they have been kept limited by what must have been an unremitting program of maintenance. The entire layout is one that would have been optimal both for towed riverine commerce and for irrigation agriculture, with minimal loss of fields and gardens owing to uncontrolled meander-cutting.

One must bear in mind, however, that improvements like these incurred substantial hydrological costs. Canalization of a lengthy reach above as well as below Adab artificially increased the stream's gradient over what it would have been had meander patterns been allowed to develop naturally. As Schumm observes, "a river in most

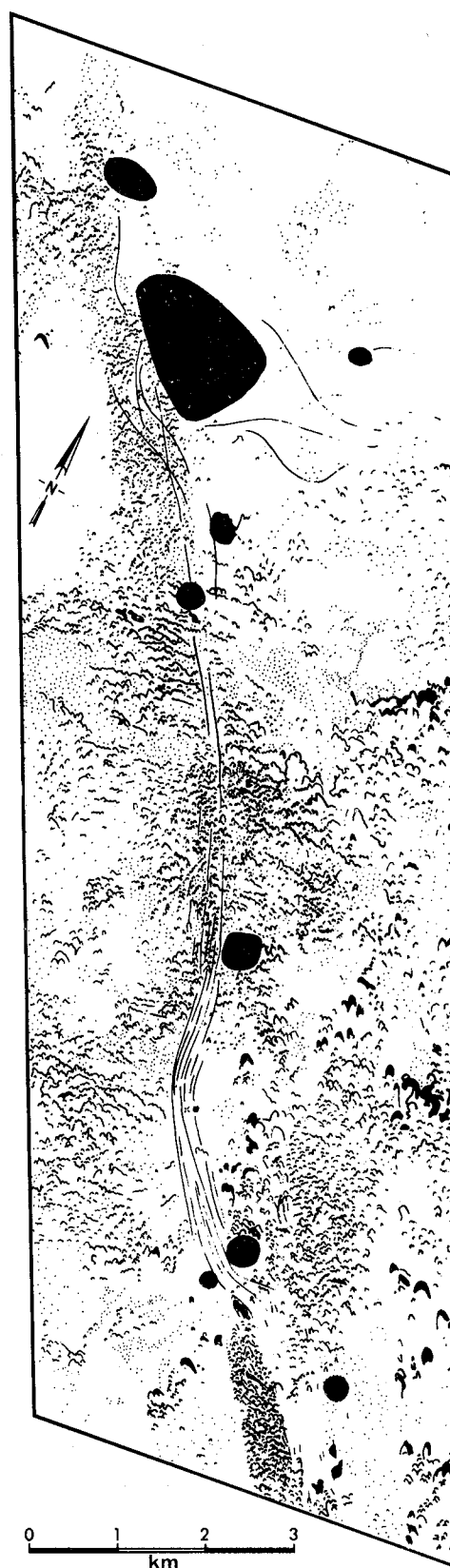


Fig. 32. The third millennium Euphrates at ancient Adab, also showing modern (ca. 1962) dune formations.

cases can be straightened or made more sinuous, but there is a limit beyond which the channel becomes unstable and aggradation and blockage of the channel or severe scour and bank erosion result" (1977, p. 149). In fact, the apparent width of the stream below Adab may be a reflection of these processes at work, with a wide, shallow, braided pattern having been substituted for what would have occurred under less disturbed conditions. One can see in figure 31, moreover, that the predominantly linear, canalized system is interspersed in at least two parts of the region shown by areas in which meanders were allowed to develop vigorously and perhaps with very little effort at control. This can hardly be understood as a feature of intentional design, since the areas in question, including one around Isin and one in the vicinity of Zabalam and Umma, would have represented a considerable disruption of local land use and communications patterns. Probably their existence must be understood as an unavoidable compromise between the watercourse control and modification objectives of state planners of the time and the powers of the natural hydrological system to reassert itself (cf. above, p. 21).

As figure 31 shows, zonal irrigation systems were introduced in many parts of the region. Perhaps the largest, at least within the intensively surveyed area, lay north and east of Nippur. There we can identify a roughly rectangular latticework of new canals adjoined by scores of new settlements. Most of the latter are fairly small and must have been primarily occupied by cultivators, but at least one (site 639) was unquestionably of urban proportions. Conceivably this could be the one in which Shu-Sin (2036–28 B.C.) resettled the war captives he brought from Shimanum and surrounding districts (Gelb 1973, p. 76).

There were other latticeworks of new, integrated canal systems, seemingly smaller than the one northeast of Nippur. Most were later in their time of construction and primary use, since they adjoin cities that emerged (or re-emerged) into political prominence only after the collapse of the Third Dynasty of Ur. One lay south of Isin and presumably postdates Ishbi-Erra's (2017–1985 B.C.) usurping of Ur's powers and administrative system. Its western and southern peripheries abut the frontiers of modern cultivation and hence the limits of survey, so that perhaps it was originally more extensive than is shown in the figure. But the absence of reported remains of this time on administratively recorded sites within the cultivated zone (see above, pp. 15, 43) argues against any substantial underestimation in the area of the system owing to this factor.

An additional latticework of intermediate size ran southeast from Uruk and its northern environs to and beyond Larsa. It too must date to the "Zweite Zwischenzeit" of contending successor states after the fall of Ur, possibly owing something to the Sinkashid dynasty in Uruk (ca. 1865–1810 B.C.), but more probably reflecting the vigorous economic policies of Larsa kings during the

long span of that dynasty's prominence between Gungunum (1932–1906 B.C.) and Rim-Sin (1822–1763 B.C.) (Edzard 1957; Falkenstein 1963). The scale of state-sponsored irrigation activity of that time is illustrated by a series of tablets from the reign of Sumuel, in about 1880 B.C. Records were kept of the fabricating of more than 1,300,000 bricks, about a third of them not merely sundried but also fired, and the whole constituting a volume of some 30,000 cubic meters, for the installation of a single reservoir at the mouth of the Isin canal (Walters 1970, p. 137). Much was also made by other Larsa rulers, including Rim-Sin, of the prosperity induced by royally sponsored canal projects, some of them even "leading to the sea," while in his time as well as that of Sin-iddinam (1849–43 B.C.) undertakings as ambitious as the restoration of (a portion of) the bed of the Tigris were proclaimed in royal annals (Sollberger and Kupper 1971, pp. 191, 205–6).

Finally, textual sources from Umma indicate that a similar latticework extended eastward from that city in the direction of Lagash, and the number of canals and fields whose names are mentioned in Umma texts suggests that Umma's canal system must have been of considerable size (Sauren 1966). In that direction again, unfortunately, modern frontiers of cultivation have heretofore foreclosed the possibilities of intensive archaeological survey.

There is less to be said of the Old Babylonian period, primarily because it was a time of sharp economic and demographic retrenchment. Figure 33 provides no evidence whatever of newly resettled areas or other new irrigation initiatives, and table 13 records a 40 percent decline in the aggregate area occupied by the major urban centers (those over 40 hectares in size).

By the last decades of the eighteenth century B.C., dated tablets had virtually disappeared from southern cities (Stone 1977, fig. 2), probably not signifying their uniform and complete abandonment but surely suggesting a deep disruption in the routine fabric of civil administration and ritual. Old Babylonian sites directly on the bed of the Adab-Umma channel (e.g., sites 1175, 1460), the main artery of settlement in the Ur III period, suggest that its flow had ceased entirely. Quite possibly it had been replaced by much smaller canals running along its banks or levee, but at the very least the volume of water available for irrigation must have been greatly reduced. Moreover, the possibilities of shipborne commerce to and through this particular region must have essentially disappeared. Citing the repeated references to the extension of irrigation systems and the founding of new settlements in northern Babylonia by the predecessors of Hammurabi, Nissen rightly observes that these forms of greatly increased water utilization upstream were surely an essential source—one might even guess *the* essential source—of the ensuing decline throughout the heart of Sumer (1976, p. 24, n. 79).

The pattern of Cassite occupation, shown in figure 34,

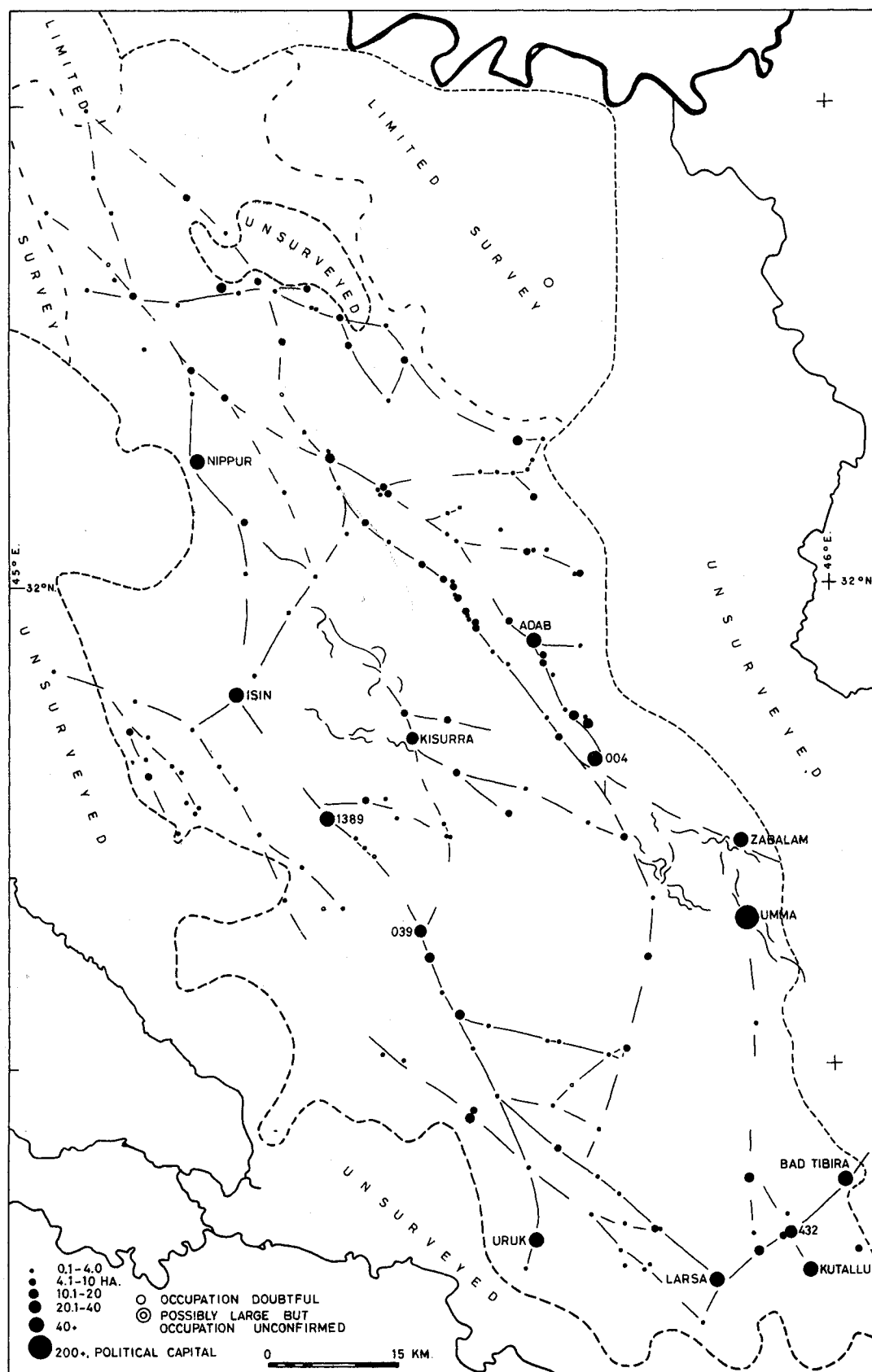


Fig. 33. Old Babylonian period settlement patterns.



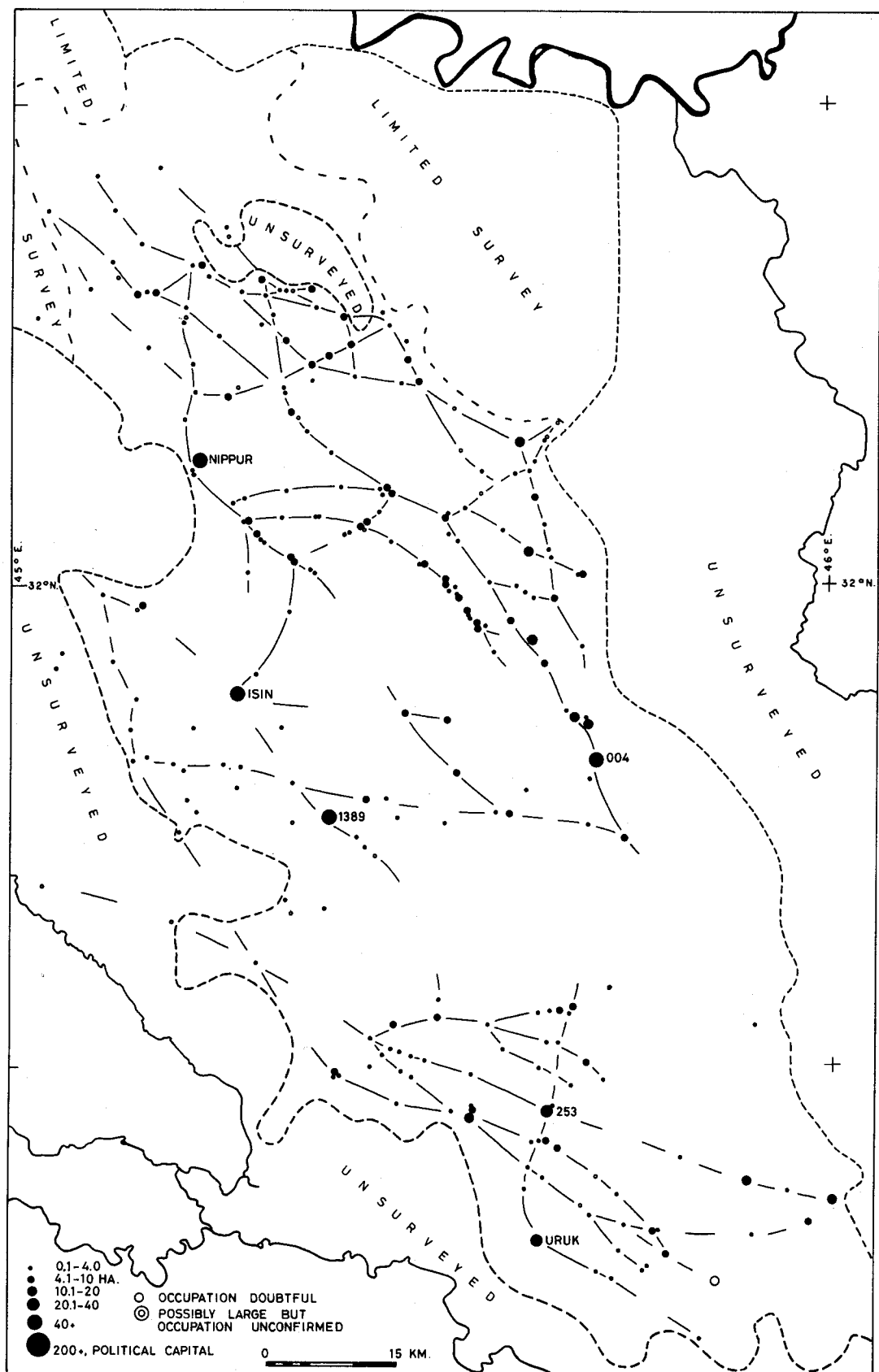


Fig. 34. Cassite period settlement patterns.

initially appears little different from Old Babylonian times. On closer inspection, however, the dependence of the southern part of the region on lengthy canals from the west-northwest had become much more pronounced. It is not at all certain that significant supplies of irrigation water were continuing to find their way into the region around Uruk, not to speak of other ancient cities to the south and east of it, along any of the old levees that led down from the north and north-northwest. There was a kind of geographical fragmentation, in addition, in which districts began to detach themselves from one another and to constitute increasingly distinct enclaves. And the declining total population suggests that even within these enclaves an at most fairly extensive and dispersed form of agriculture was carried on. The cumulative effect of these trends becomes clearer if the map of Cassite settlement and irrigation is compared not merely with that of the preceding Old Babylonian period but with the markedly thinner occupation of the following Middle Babylonian period as well. The latter is shown in figure 35.

Three principal enclaves can be distinguished within the intensively surveyed area. The largest seems to have had Nippur as its "capital," and Nippur's rich archival materials of Cassite date indeed clearly identify it as one of the most important administrative centers in Babylonia as a whole. Isin was the major city in the second, supplemented by the impressive and previously recorded center at Umm al-Khezi (site 1389) and perhaps for a time also by Jidr (site 004). Uruk exercised the same dominance over the third.

The formation of these local realms seems to have coincided with an abrupt, unprecedented change in the hierarchy of settlement sizes. Dispersed, small villages attained a higher frequency than ever before, as did towns of less than 10 hectares of occupational area. But at the same time there were sharp drops in both the numbers and the aggregate area of urban sites larger than this. Cities of the largest size category disappeared altogether (cf. table 13, fig. 25). A typical unit of settlement in both the Cassite and Middle Babylonian periods consisted of a string of extremely small sites, relatively close together along a canal and often separated from other such strings by considerable distances. The pattern for each of the enclaves tended to become one in which one or two large, probably well-fortified centers dominated their hinterlands, while most of the population lived in small agricultural villages. A kind of "feudalism" is evident, perhaps not in the sense of institutions and relationships specifically recalling medieval European vassalage, but in the more generalized sense of a decentralized system of landed, patriarchal authority with a wide bifurcation between the mass of depressed agricultural population and a strong military elite.

One of the important Cassite-Middle Babylonian canals supplying the district north of ancient Uruk has been fortuitously exposed by surface erosion, permitting a

more detailed glimpse of the rural irrigation regime. The compact, resistant clay of the canal's bed, some 8 meters wide, could be followed fairly continuously for more than 5 kilometers, even though the associated spoil banks had been almost completely scoured away by the wind. Within this distance six roughly contemporaneous archaeological sites were identified (1570, 1584, 1589, 1590, 1592, and 1594), including three of 0.1 hectare or less, one of 0.6 hectare, one composed of two adjacent mounds aggregating 3.6 hectares, and one so small that it may have consisted of only a branch canal head gate and closely associated structures.

Clearly, only a modest population depended for its living on at least this particular channel, even along the well-exposed segment where it can be followed with high expectation of virtually complete recovery of adjoining sites. The absence of contemporaneous sites for some distance upstream or downstream along the same general line reinforces this impression of an extremely dispersed as well as limited rural population. Yet the uniformity and linearity of the canal and the surviving traces of its spoil banks leave no doubt of the labor-intensive character of its construction and maintenance. At site 1590, in fact, there is a kind of metaphor of the succession of irrigation and settlement systems. Surface ripples and vegetation patterns trace out the shifting bed of a meandering, essentially "natural" stream from the north or northeast, flowing past the nucleated ruins of a town (site 1591) that may have survived into the Old Babylonian period. Like the town (and perhaps for the same reason), the stream expired at about this time. Running across and superimposed upon the traces of its bed was the straight ribbon of the bed of the Cassite-Middle Babylonian canal from the west-northwest, serving few if any towns and accompanied instead by a string of small, amorphous hamlets.

This local vignette, or at any rate the larger pattern it exemplifies, suggests a different perspective on the cyclical pattern of centralization and fragmentation to which much of this chapter has been devoted. Middle Babylonian population densities seem to have drifted downward to levels that had not been obtained since the Uruk period, three millennia earlier. But this emphatically did not imply the full restoration of earlier conditions, as if one hundred and fifty intervening generations had had little appreciable effect. The Cassite and Middle Babylonian cities, after all, were the repositories of a rich literary and cultural tradition that had taken shape over this long span. The Bronze Age had come and gone, but the Iron age now beginning would transform not only local technologies and economies but also the mechanisms and motivations for interregional contact and conflict (Childe 1942, chap. 9). New domesticates had been introduced or borrowed, among them the camel, that enabled nomadic peoples of the arid Syro-Arabian steppelands to begin to encroach upon the civilizations of the Fertile Crescent as a historical force

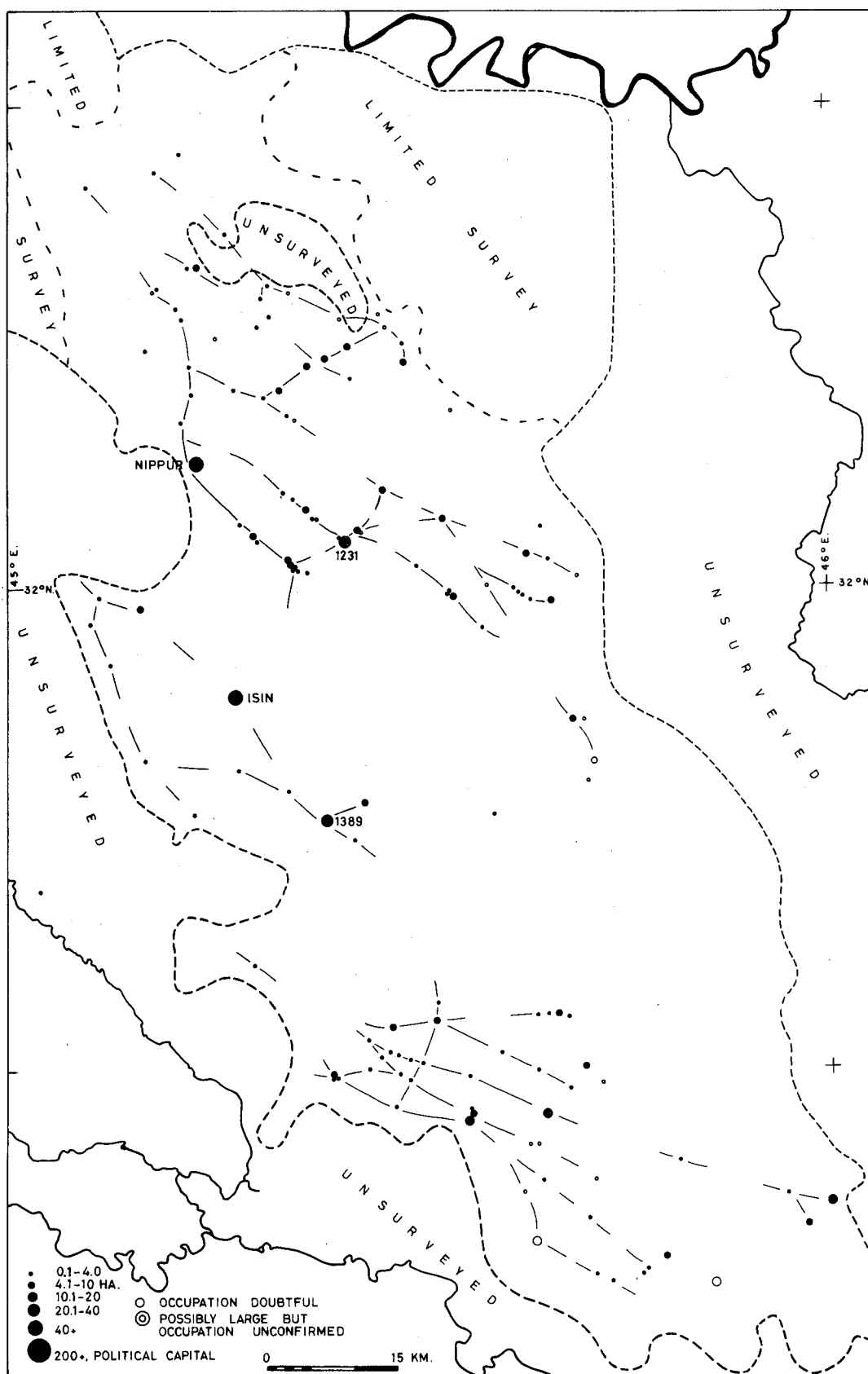


Fig. 35. Middle Babylonian period settlement patterns.

(Bulliet 1975). Above all, the frontiers of the known world had spread immeasurably.

Even at the strictly local level, however, the pattern was appreciably different from that in the fourth millennium. Dispersed or not, the regime was highly articulated politically, authoritarian, and hierarchically structured into distinct social classes. With the perfection of a writing system and the growth of a tradition of literacy had come subtle, complex, tenaciously retained bureaucratic forms of high administrative "density." Extensive canal irrigation had been introduced that involved planned, massive interventions in natural systems of drainage. Rather than withering away under conditions of population decline

and ensuing economic and political stagnation that began in the late Old Babylonian period, these public works were even intensified for a time before the growing urban isolation and paralysis accompanying Aramean invasions in the tenth and eleventh centuries and the later Neo-Assyrian conquests. No comparable feature was present three thousand years earlier to even a remotely similar degree. There were profound continuing oscillations in Sumero-Akkadian society, settlement, and patterns of land use, in other words, but we cannot fail to recognize that here were cumulative, underlying forces for change and development as well.

## APPENDIX

### THE SURVEY DATA BASE: LATE EARLY DYNASTIC-MIDDLE BABYLONIAN SITES AND CHRONOLOGICAL INDICATORS

As I indicated earlier (pp. 130–31), the data on which the foregoing discussion is based are more limited and less reliable than those employed in chapter 3. A high proportion of historic sites were found to have had multiple occupations or reoccupations, making estimates of settlement size for successive periods particularly difficult. Hence it is impossible to summarize the descriptive data on site size more concisely than previously. Occupations for various periods are given in table 14, in terms of fairly broad size categories rather than estimated areas, but even within this looser framework it has not been possible to make all assignments with equal confidence. Readers are referred to the general site catalog (chap. 7) for fuller descriptive material on individual ancient settlements.

No attempt was made to record systematically the ceramic and other dating indicators observed on sites that were occupied during this range of time. It is not at all clear that systematic, randomized investigations of surface collections provide a useful approach to the analysis of complex, multiperiod occupations, at least without devoting extremely long periods of analysis to each of the individual sites so considered. But the presence of fairly well-defined dating indicators was noted, as was their more or less extensive areal distribution over the site surface. Continuing the narrative of Appendix A to the previous chapter, the following were the principal "index fossils" that were distinctive, common, and securely enough dated to be useful.

#### *Late Early Dynastic Period (Early Dynastic II–III)*

The criteria employed during the Warka survey (Adams and Nissen 1972) were followed with little change. Conical cups (AD) continued at least into Early Dynastic III times,

but the later forms tend to be distinguishable from the earlier in that they became progressively wider and shallower. Supplementing them were small cups with inward-beveled or inverted rims (AE) and larger cylindrical beakers (AF). "Fruit stands" (GC) continued, probably becoming considerably more common. Finally, baked planoconvex bricks (LG) are not infrequent on sites of this period. This form of brick made its appearance in Early Dynastic I times, but all but one of the observed examples stem from sites on which the surface material reflects an occupation lasting into the later part of the Early Dynastic period or even later.

#### *Akkadian Period*

A somewhat different approach to periodization is taken in this study than in the Warka survey, in that here the Akkadian and Ur III periods are kept separate. The basis for the change does not lie in improvements in stratigraphically secure, excavated findings but instead stems mainly from observed homogeneous grouping of surface collections. According to the severity of the reservations individuals will wish to attach to any chronological conclusions drawn from surface materials, the differentiation between the two periods that is now proposed must be regarded with a corresponding degree of provisionality if not skepticism. Some independent support for differentiating between the periods is perhaps afforded by the significantly different settlement patterns that emerge when this is done, a finding that is the basis for much of the discussion in chapter 4.

The apparently coherent conspectus of types that was used to denominate the Akkadian period included the following: horizontal ribs, triangular in section and usu-

ally forming a concentric series, applied to the shoulders of large ovoid jars (Delougaz 1952, pl. 101; McCown and Haines 1967, pl. 81:9; Hrouda 1977, Taf. 26); large, deep bowls with a prominent, large-diameter spout with beaded lip, usually with down-sloping flange rims (Delougaz 1952, pl. 169; C.053.312; Hrouda 1977, Taf. 27; McCown, Haines, and Biggs 1978, pl. 47:7); ovoid jars with rounded to bluntly pointed bottoms, slightly constricted necks, and sharply profiled rims (Delougaz 1952, pl. 160: B556.540; McCown and Haines 1967, pl. 80:18); and incised-comb meander patterns between horizontal bands of similar incisions, typically on shoulders of large jars. It must be conceded that a number of these types may well have continued for some time under the Third Dynasty of Ur.

### *Ur III-Isin-Larsa Period*

While the Akkadian and Ur III periods have been differentiated in this account, an opposite approach is taken with regard to the division that was recognized between the Third Dynasty of Ur and the Isin-Larsa period at the time of the Warka survey. The problem to which this is a perhaps debatable response emerged with full force only upon the publication of the long ceramic sequence spanning much of the first, second, and third millennia B.C. at Nippur, not yet available at the time of the Warka survey fieldwork. As Donald Hansen succinctly stated before publication of that large and stratigraphically fairly secure body of material, some forty pottery types could be recognized in levels succeeding the onset of the Third Dynasty of Ur. These pottery types, he argued, "present a continually evolving series; there are no sharp breaks until the end of the First Dynasty of Babylon" (Hansen 1965, p. 210). Leaving the Old Babylonian aspect of this generalization for further discussion below, his observation suggests the difficulty of trying to impose a break after the Ur III period on the basis of surface collections alone. To be sure, McCown's final analysis of the "Range and Frequency of Pottery Types" (McCown and Haines 1967, table 2) lists six that began only with the Larsa period. Upon closer inspection, however, these all prove to be either infrequently occurring or else based on features of generalized vessel form that are difficult to distinguish in the typically fragmentary material to be found on site surfaces. Hence a grouping of Ur III and Isin-Larsa diagnostic criteria appears to be the least objectionable course of action, even though it has the severe disadvantage of conflating historically very distinctive periods.

The following ceramic features were considered to best reflect occupations within this span of time: cylindrical or ovate jars with concave or inset necks, beveled or flaring rims (the latter frequently with profiled undersurfaces), and low disk bases (McCown and Haines 1967, pl. 84); flaring, carinated bowls with grooved vertical rims (McCown and Haines 1967, pl. 82; Hrouda 1977, Taf.

27-28); "collander" sherds with evenly spaced, circular holes (McCown and Haines 1967, pl. 82); large flaring-sided jars with a characteristic decorative pattern on their slight shoulders and vertical to slightly flaring necks that consists of horizontal ridges and grooves combined with a comb-incised meander (McCown and Haines 1967, pl. 84:21); narrow stump bases of small oval or cylindrical jars (Delougaz 1952, pls. 152, 184); and inset bases of thin-walled, well-made cups with vertical or concave sides (Delougaz 1952, pl. 153; McCown and Haines 1967, pl. 89). Stump bases and thin-walled cups, it should perhaps be added, are apparently indicative of occupations during the latter part of this interval. At a few sites an effort was made to discriminate between Ur III and Larsa occupations on this basis, but this generally proved more difficult than in the Diyala region, for example, where the cups in particular were notably more abundant (cf. Delougaz 1952, pl. 115).

### *Old Babylonian Period*

The absence of a clear succession of types coinciding with the rise of the First Dynasty of Babylon has already been indicated. McCown's table of distributions indicates that only three types went out of use, and six others appear approximately contemporaneous with that historic northward shift in the fulcrum of political power. None of these individual replacements prove to be especially useful when one is confined to working with surface collections. If one views the distribution of types at a slightly higher level of aggregation, however, a picture of substantial, fairly rapid change in the conspectus of pottery types emerges that is more helpful. Six types went out of use during or immediately after the late Larsa period, and no less than seventeen were introduced either during the late Larsa period or at the end of it. Regarding the late Larsa period as a kind of transitional interval, therefore, it seems both possible and worthwhile to distinguish broadly between Ur III-Larsa surface collections on the one hand and (late Larsa-) Old Babylonian collections on the other.

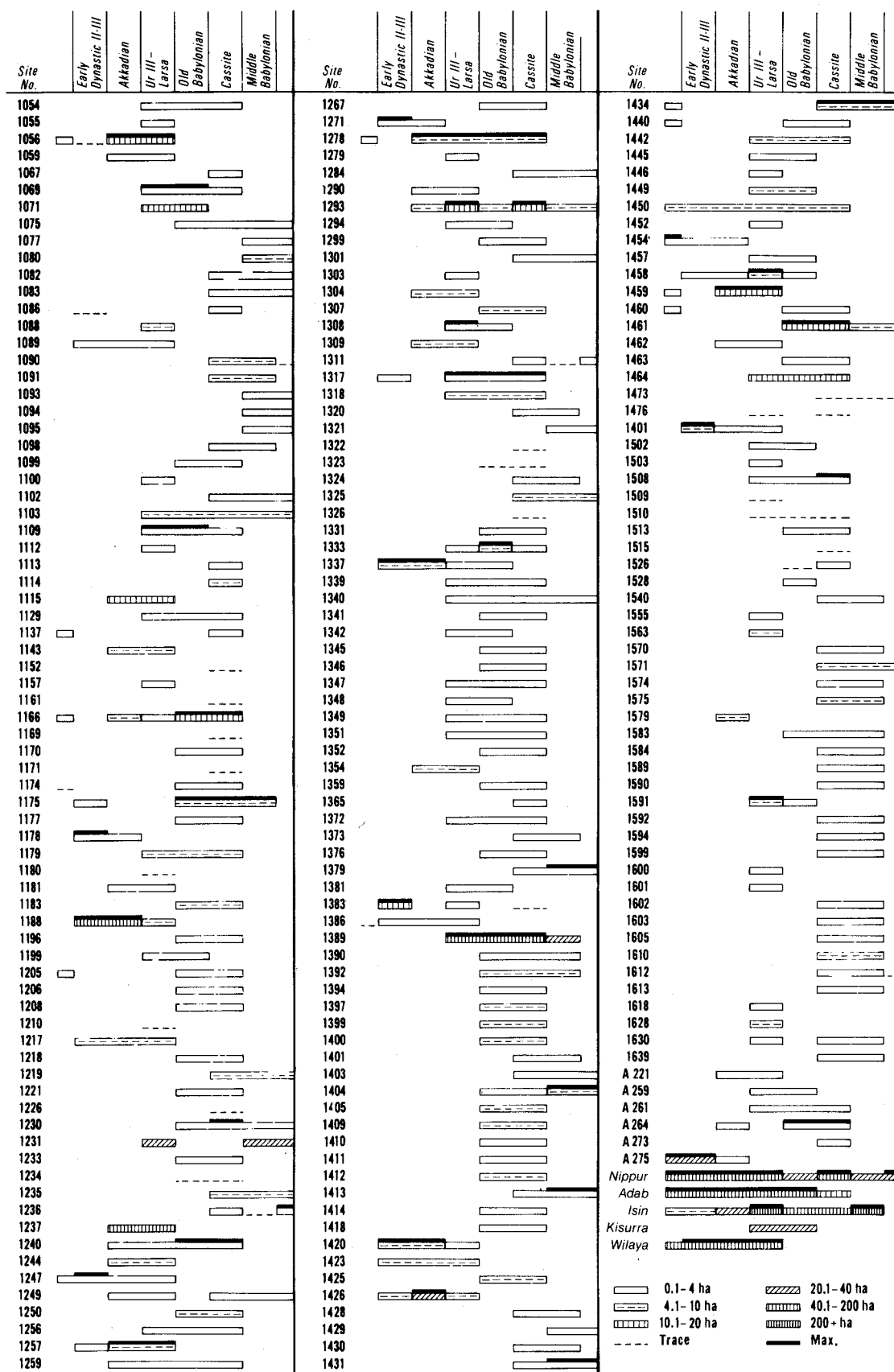
Two features in particular are sufficiently common and unambiguous to permit identification of Old Babylonian surface collections. The more important is a globular jar of moderate size with a low, slightly flaring collar, often a pair of horizontal grooves incised on the upper body, and a low ring base creating the impression of an attached button (Delougaz 1952, pl. 163:B.656.720; McCown and Haines 1967, pl. 90). The second, also widely occurring and useful, is a large, rounded jar or urn with a pronounced, generally horizontal flange rim over a series of horizontal grooves or ridges, generally with a ring base (McCown and Haines, pl. 89).

### *Cassite Period*

Hansen notes the "tremendous change and break in

TABLE 14 Periods of Occupation and Size Categories of Sites from the Third, Second, and Early First Millennia B.C.

Site No.	Early Dynastic II-III	Akkadian	Ur III - Larsa	Old Babylonian	Cassite	Middle Babylonian	Site No.	Early Dynastic II-III	Akkadian	Ur III - Larsa	Old Babylonian	Cassite	Middle Babylonian	Site No.	Early Dynastic II-III	Akkadian	Ur III - Larsa	Old Babylonian	Cassite	Middle Babylonian
001							320							746						
002							333							747						
004							336							748						
005							341							749						
011							351							770						
016							352							771						
019							353							772						
020							355							781						
021							358							783						
025							359							794						
027							360							795						
032							361							798						
039							365							802						
040							385							807						
041							392							815						
049							400							818						
050							403							820						
052							405							822						
061							412							824						
070							413							826						
078							424							827						
095							425							828						
099							427							831						
100							428							832						
129							429							834						
130							430							835						
131							431							838						
139							432							844						
140							433							845						
142							437							854						
145							438							858						
148							439							861						
149							443							865						
150							444							869						
151							446							871						
152							448							875						
156							451							898						
157							453							932						
161							455							933						
162							457							944						
164							458							947						
165							459							951						
168							62							954						
169							463							959						
172							466							960						
175							Urur							970						
176							Larsa							971						
190							Shuruppak							972						
197														976						
198														983						
200							529							989						
204							535							993						
213							573							994						
235							576							996						
242							584							997						
247							586							999						
248							627							1000						
253							639							1001						
254							667							1003						
255							671							1005						
258							672							1006						
259							673							1007						
261							674							1008						
263							682							1009						
267							706							1019						
278							713							1021						
279							714							1024						
280							715							1025						
283							720							1027						
287							721							1031						
294							722							1032						
300							734							1034						
301							738							1036						
311							740							1037						
315							745							1049						



Mesopotamian culture" at the end of the Old Babylonian period (1965, p. 213), and this is confirmed by the very extensive, nearly total replacement of the inventory of ceramic types at Nippur. Many of the new types were of course repeatedly recognized during the survey, but a single one of them was so nearly ubiquitous that in most cases it was allowed to stand individually for Cassite occupations. This is a tall chalice with a concave neck and almost cylindrical body, tapering toward a massive, solid base with a large, disk-shaped foot (McCown and Haines 1967, pl. 98:14-16; Hrouda 1977, Taf. 28; McCown, Haines, and Biggs 1978, pl. 50:6).

A second useful shape for dating purposes is apparently a derivative of the globular jar with "button" foot of Old Babylonian times. Two changes generally occur in this form. Perhaps more important, the proportions of jar body and collar change, with the latter becoming vertical or concave and much taller, in fact frequently contributing as much or more to total vessel height as the body itself. In addition, the button or low disk base continues but often is attached to a short cylindrical pedestal rather than directly to the lower body (McCown and Haines 1967, pl. 98:1-5, 11-13; Hrouda 1977, Taf. 28; McCown, Haines, and Biggs 1978, pl. 49:6, 8-9). A third common vessel form is a low, thick-walled, carelessly made flaring bowl with a rounded and sometimes thickened rim and frequently a string-cut base (McCown, Haines, and Biggs, pl. 49:10). Some examples have a groove or slight carination on the upper exterior, and associated rim forms may be widely everted, beveled, or incurving (McCown and Haines 1967, pls. 97, 100; Hrouda 1977, Taf. 28). Note that while this series of forms does not antedate the Cassite period it may have continued for a half-millennium or more after that.

### *Middle Babylonian Period*

The long interval from the decline of Cassite hegemony until the rise of Babylonian resistance against the Assyrians on the eve of the formation of the Neo-Babylonian kingdom is poorly attested archaeologically. Ultimately we may expect that continuing excavations at Nippur and Isin not only will shed light on the vicissitudes of urban life in a sharply declining number of political cen-

ters but will clarify the ceramic and architectural sequences as well. In the meantime, however, this remains a little-known intercalary period, with attitudes toward its limited cultural attainments aptly summarized by casual reference to it among fieldworkers as the "V.D." (Various Dynasties) period. Within the framework of sharply curtailed, perhaps often impermanent settlement and a general lack of secure ceramic stratigraphic criteria with which to make firm attributions of what sites did continue in at least periodic use, the survey was forced to rely largely on imprecise, inductively established criteria that are at best highly tentative and insecure.

The problem of identifying Middle Babylonian diagnostic criteria, at least until stratigraphically secure typological series spanning the period are made available from excavations, is rather like the previously abumbrated problem with the Jemdet Nasr period. Distinctive traits limited to this period are not known, so that for a site occupied at this time alone one is forced to rely primarily on the presence of certain continuing traits, together with the absence of others that are directly associated with the periods immediately preceding and following. Sites are described herein as exclusively Middle Babylonian when they lack Cassite chalice fragments or any of the somewhat less distinctive Neo-Babylonian traits, but when their surface materials in other respects are quite similar to those of Cassite sites. A subjectively perceived difference is that pottery manufacturing techniques became even more careless after the rather low standards of the Cassite period—jars and particularly bowls were made with thicker walls, and the rims of the latter were progressively thickened and rounded until they might be described as having a ropelike appearance.

Commonly occurring on Middle Babylonian sites are low tubular pot stands, with simple rounded or rope rims and more or less constricted midsections (McCown and Haines 1967, pl. 102:20). Excavated examples are unfortunately still too rare for us to speak with confidence of the longevity of this type. Quite possibly it covers the entire span from Cassite through Neo-Babylonian times. The same applies to small cup bases that may be characterized as irregular, rodlike stumps (McCown and Haines 1967, pl. 100:21-23).



# 5

## Culmination and Collapse of an Agrarian Base and Urban Superstructure (*Neo-Babylonian–Late Islamic Periods*)

The culminating historical epoch to which we now turn saw a repetition and intensification of many of the central themes of the preceding one, attaining both a new level of economic accomplishment and its seeming antithesis. For the longer, initial part of it there was a cumulatively impressive, if irregularly sustained, growth in the scale and integration of the agricultural regime. At least partly as a result, by the Sasanian and Early Islamic periods, city-building, population density, and most other manifestations of complex, differentiated social life had attained levels transcending anything known earlier. Instrumental in these developments were cadres of administrators under increasingly centralized direction. Providing the improved coordination needed for widely extended empires, they also made possible unprecedently destructive and despotic exercises of state power. Linked in another, probably complementary way to the growing socioeconomic core were networks of commercial intercourse that penetrated more deeply than ever before into the day-to-day interpersonal relations within the society at large.

But then, corresponding to the somewhat similar reversal during the second millennium B.C. that was dealt with in chapter 4, seemingly well integrated systems fragmented before a growing array of political, economic, and ecological disorders. The basis for an urban mode of life subsequently was eliminated for centuries within the immediate region of the archaeological portion of this study, and until almost the advent of the modern era even the nonurban, sedentary population shrank back below any recorded point after the fifth millennium B.C. However, the curve of growth and decline—in both epochs—was characteristically less smooth than sweeping summaries like this may seem to imply. At all times superimposed on the slow, underlying pattern of advance followed by deterioration was a harshly sudden, uncon-

trollable convergence of external and internal, stabilizing and destabilizing forces that produced destructive short-term oscillations of their own.

Alongside this similarity between the two epochs with regard to the broad outlines of a developmental pattern, admittedly there will be found many vital differences. Technology and organizational consciousness, tending to grow accumulatively, must engender some such differences. Others involve the greater dependence upon external forces of what took place during the later of the two epochs. Partly, this is a matter of a significant change in the scale of the key units of study; city-states became submerged in the large regions around them. But it is also a matter of more extensive as well as intensive patterns of interaction that pay less respect even to regional boundaries. To be sure, the Mesopotamian city-states of the third and second millennia B.C. likewise cannot be understood as truly isolated in their processes of growth and change; this was the meaning of the rejection of the zero-sum game metaphor in chapter 4. But the fabric of interactions across local, regional, and all other traditional barriers now became perceptibly denser, and the lessons that can be drawn by concentrating exclusively on a sharply defined geographic focus of study become correspondingly fewer and more qualified.

For much of this new epoch the peoples of the lower Mesopotamian plain were more or less firmly incorporated in larger, longer-lived, more heterogeneous empires than had existed previously. They usually provided a disproportionately large part of state revenues because of the scale and productiveness of Mesopotamian irrigation agriculture. But for the most part they did not furnish the consolidating impulse or determine the main institutional forms that the empires took. Lying within range of increasingly powerful and sophisticated military forces from Anatolia and the Mediterranean littoral as well as

from Iran, the occupants of the alluvium were repeatedly subject to destructive attack. Great power rivalries beyond their control, in other words, more and more frequently dictated the oppressive tax, service, and other burdens that the indigenous Babylonian population was forced to bear.

We must assume that there were two interacting economic elements involved in the subordination of Babylonian autonomy within larger, imperial frameworks. One was the relative productivity of irrigation agriculture, disregarding local and temporal fluctuations and considering it only in the aggregate. When means were found to suppress internal urban rivalries while also holding off external predators, this permitted rulers to amass reserves larger than in any neighboring region. With its networks of rivers and canals permitting rapid, economical concentration of these reserves by waterborne transport, Babylonia could be made to serve a new strategic role as the granary of much more extensive realms. Its permanent pacification was vital for this purpose, even though the more peripheral provinces could be much more loosely knit together by more or less centrally supported armies. Insofar as we think of Babylonia's agricultural surpluses as the foundation for precariously maintained but often long-lived polities of this new kind, our attention is directed to what must have been intensifying networks of local or regional production or exchange. The difficulty is that such networks can as yet be discerned only very dimly and at long intervals, since the major interests of historians and archaeologists have been directed elsewhere.

The second subordinating element has tended to receive much more attention. Its real importance is somewhat difficult to judge, since most of the evidence that is adduced derives from the circum-Mediterranean world rather than from Babylonia itself. But unquestionably there was a massive new preoccupation with long-distance trade, ultimately binding the western Mediterranean world to India and even China. The heavy drain of Mediterranean gold to the farther Orient for spices, silk, and other luxury products is thought to have influenced Roman expansionist policy, of which Mesopotamia was repeatedly a victim (Nodelman 1960, p. 109). Commerce-dependent states like Palmyra, Petra, and Gerrha sought to monopolize control of the transit traffic for their own advantage. The resulting moves and countermoves form too far-flung and complex a sequence to be gone into here, but their net effect was certainly not to enhance either the independence or the well-being of the Mesopotamian countryman.

The growth of the transit traffic and the emergence of the new, desert-based kingdoms are interdependent. Underlying both, surely, was the spread of the domestic camel, for without a reliable, economical mode of long-distance transport under arid conditions the erratic and

costly conditions of supply probably would have diverted the growth of demand in the Mediterranean world in other directions. But beyond the often considerable influence that the new polities had even within Mesopotamia proper was a yet more profound shift. The camel for the first time made highly mobile but dispersed groups of desert tribesmen militarily formidable. Politically and ethnically stable and insignificant through the second millennia B.C., the southwestern border of the Tigris-Euphrates alluvium accordingly had already begun to be a source of incursions and disruptions in Neo-Assyrian times. Much later, the profound transformation effected by the Muslim conquest would have been unthinkable without the camel as the primary means of the Arab armies' supply, rapid mobilization, and successful attack on larger Sasanian armies.

Yet the massive conversion to Islam that followed only after a delay of several centuries, within the alluvium as elsewhere, was not in any sense the first substantial abandonment of indigenous Mesopotamian traditions in matters of religion. Syncretistic elements drawn from other areas of course were present much earlier. But it is significant for the more general decline in Mesopotamia's cultural distinctiveness or salience—a process whose onset long antedated Islam and the growth of decisive military pressures based outside the fertile, densely populated river valleys—that by the Sasanian period indigenous beliefs had largely lost their institutional expression. What the Arabs encountered instead was a society compartmentalized into self-enclosed Christian, Jewish, and Zoroastrian "minorities," all of whose immediate religious antecedents lay primarily in other regions.

The sources for a study of settlement, land use, and agriculture during the periods of concern here are as heterogeneous as this sketch of a gradually submerged autonomy implies. Archaeological surface collections serve as the main point of departure. Details of the survey data derived from them are provided in this chapter's appendix, together with an assessment of special problems affecting the data's consistency and reliability. Particularly for the earlier part of the epoch, such problems assume great importance. The Neo-Babylonian, Achaemenian, and Seleucid periods are very poorly defined in terms of archaeological criteria that can assist in accurately dating surface collections. Within that long span of time, even the order of occurrence of settlement patterns that can be differentiated on the basis of typologically distinguishable surface collections is debatable, and absolute dates can be assigned only with wide margins of uncertainty. Conditions are improved in every respect for the Parthian, Sasanian, and Islamic periods, although crucial ambiguities remain in the absolute dating of typological sequences.

The problems and potentialities of the documentary

record are of a different order. Knowledge of cuneiform writing on clay tablets flickered on into the first century A.D., but for the last few centuries was an increasingly arcane practice that had less and less to do with day-to-day administrative and economic requirements. Impressive archival activities had continued through the Seleucid period, in considerable part carried on by temples that had assumed complex, widely ramifying economic functions. Much remains unpublished, however, and institutionally oriented studies that would make the material intelligible to the nonspecialist are just beginning. At least with respect to agricultural management, the outstanding exceptions are a group of Neo-Babylonian-Achaemenian texts from Uruk and the so-called Murashu archive from Nippur, dating about a century later in the Achaemenian period, to which a fuller discussion will be devoted below.

The records in Aramaic that complemented and replaced late Babylonian unfortunately were written mainly on perishable materials that have not survived. Hence there is a deep lacuna in our knowledge of the Parthian period, compensated for only to a very modest degree by numismatic studies and by limited, frequently tendentious references to conditions and campaigns in Parthia that are to be found in Roman sources. There is some improvement in the Sasanian period, particularly as a result of historical compilations made only after the Islamic conquest. References to conditions of town and rural life are rare in such materials, although some contemporary gleanings along those lines have been extracted from the Babylonian Talmud. Even for the first century or so of Islam, strictly contemporary records from Iraq, not subject to anachronistic emendations by later polemicists and copyists, are virtually absent. Later materials appear in a veritable flood, although in large part with religious, political, and narrowly urban preoccupations that limit their usefulness for reconstructions of the agricultural economy and conditions facing the mass of the rural population who sustained it.

Thus there is a discontinuous, disjunctive quality to the kinds of data on which this study can draw. The greater degree of internal continuity characteristic of the region in the third and second millennia B.C. unquestionably permits a more systematic, consistent approach than is possible for this later epoch. Were a fuller archaeological record available, it might go some distance in repairing these deficits. But once again most of the archaeological fraternity still tends to link archaeological priorities to the acquisition of texts and the limited—primarily state and temple—interests that literacy served, rather than to the most effective service that can be performed in reconstructing broader cultural patterns; hence it has turned its attention to other periods.

Conceding difficulties, it is yet useful to begin assembling what is known and to suggest a few of the plausible

possibilities to which that knowledge points. As previously, within the area of intensive coverage the archaeological survey provides information on changes in demography and settlement distribution that can appropriately be summarized before we turn to the less uniform but much more richly detailed textual materials. We cannot assume, of course, that this information adequately represents the whole of the alluvial land surface. None of the major power centers of the time lay within the area for which intensive coverage is available, although the environs of Babylon, Seleucia, and Ctesiphon have been reconnoitered more selectively. The presence of those centers suggests that the northern part of the plain may have been more densely occupied than the region for which at least an approach to quantitative treatment is now possible. The northern part was also, at least in Parthian times, more exposed to the destruction accompanying periodic Roman invasions. But I will postpone further discussion of the representativeness of the available data, and of geographic contrasts and historical developments that bear on the question, in order to begin by providing a clearer picture of the scale of settlement in at least one region. Parenthetically, a separation between settlements and the irrigation systems that sustained them is obviously somewhat artificial. Nevertheless, I will also withhold comment on the latter until a later section of this chapter, when textual as well as archaeological data on agriculture can be brought together to provide a more integrated treatment of the subject.

## AN OVERVIEW OF LOCAL DEMOGRAPHIC AND SETTLEMENT TRENDS

In spite of the uncertainties I outlined earlier, there is no doubt about the rapid, continued growth that got under way during—or perhaps even slightly before—the Neo-Babylonian period. This is most simply shown by the rising numbers of sites as furnished in table 20 in the appendix to this chapter. The total increases from 134 in the Middle Babylonian period to 182 (excluding questionable or “trace” occupations) in the Neo-Babylonian period, to 221 of Achaemenian date, and to 415 that are apparently Seleucid-Parthian. If we combine Neo-Babylonian and Achaemenian on the grounds that collections assigned to the two may not be readily distinguishable (below, pp. 228–31), the joint interval would be credited with 257 sites.

We may be justified in assuming that one component of this growth was the natural increase of local population, under conditions of relative prosperity and tranquillity imposed by strong dynasties. It is also likely that a large proportion of the Chaldeans and Arameans who had been forced into exile during the later years of Neo-Assyrian rule afterward drifted back to their former

## Culmination and Collapse of an Agrarian Base and Urban Superstructure

homes in southern Babylonia, perhaps accompanied by other elements left rootless in the Assyrian homeland after the fall of Nineveh. But there were in addition numerous Jews and other groups brought into Babylonia after the western conquests of Nebuchadnezzar II (604–562 B.C.). The available documentary evidence for the latter clearly (although indirectly) suggests that large masses of people were involuntarily transferred as part of intensive Neo-Babylonian efforts to rehabilitate the central region of a domain that previously had suffered severely (Eph'al 1978, pp. 81–82).

The extent of growth is even more striking if we consider areas of occupation, and thus implicitly population, rather than numbers alone. The gross Middle Babylonian occupied site area (table 13) was 616 hectares, giving an average site size of only 4.6 hectares. Calculating on the same basis for the combined Neo-Babylonian and Achaemenian periods, it was 1,769 hectares, or an average of 6.88 hectares, and for the Seleucid-Parthian period 3,201 hectares, or an average of 7.71 hectares. Thus the increment in average site size (most rapid in the Neo-Babylonian–Achaemenian times), when combined with the increasing numbers of sites, suggests a growth in the population of the region by more than five times during a span of five to seven hundred years. As the appendix to this chapter specifies, to be sure, population density may have been somewhat lower within the sprawling, partly discontinuous sites of the Parthian period than within earlier, more nucleated towns, but correction for this factor would lead to only a very modest lowering of what is still an impressive rate of increase.

To speak of average site size may be somewhat misleading since it tends to imply distribution around a mode. The reality, as we have seen for earlier periods, is that settlements formed a hierarchy of different sizes. Using the categories already applied in chapter 4, table 15 provides the distribution for the periods indicated.

TABLE 15 Numbers of Sites by Size Category and Period of Occupation, ca. 700 B.C.–A.D. 200

Size Category	Neo-		
	Middle Babylonian	Babylonian Achaemenian	Seleucid-Parthian
6 (200+ hectares)	—	—	2
5 (40.1–200 ha)	1	5	4
4 (20.1–40 ha)	3	6	15
3 (10.1–20 ha)	2	19	34
2 (4.1–10 ha)	28	70	95
1 (0.1–4 ha)	100	157	265

What emerges most clearly from this tabulation is that while the numbers of sites in all categories increased

dramatically, the rate of increase was significantly greater for large than for small sites. Average site size increased, in other words, because the proportion of large sites increased over time rather than because the number of small sites declined or became static. The point is perhaps clearer if we distinguish a broadly “urban” from a “non-urban” category. Applying the—admittedly arbitrary—criterion developed in chapter 3, occupations larger than 10 hectares may be tentatively designated as “urban.” On this basis, only 36 percent of the occupied site area in Middle Babylonian times was found in settlements large enough to be characterized as urban. Combining the Neo-Babylonian and Achaemenian collections, this figure had by then increased to 51 percent. By the Seleucid-Parthian period it had risen slightly further still, to 55 percent. This was almost exactly the same proportion as during the Third Dynasty of Ur, completing the reversal of a devolutionary trend that had continued for almost a millennium and a half.

Whereas there was about a threefold overall increase in the number of sites between the onset of the Neo-Babylonian expansion and the Seleucid-Parthian period, the above tabulation indicates more than a ninefold increase in the number of urban sites as here defined. Moreover, the majority of the urban settlements do not appear to have been already existing smaller communities that were merely expanded. Of the 29 recorded jointly for the Neo-Babylonian and Achaemenian periods, 21 provided no trace of a Middle Babylonian occupation. Even for the slower expansion in the number of urban sites between that time and the Seleucid-Parthian period, a slight majority (28 out of 55) seem to have been newly founded. It appears, therefore, that we are dealing with fairly abrupt, probably state-directed, policies of settlement formation in the case of the urban communities.

Some comparative perspective on this process of resettlement can be gained from a consideration of the concurrent sequence of development on the lower Diyala plains. The latter region had reached an extremely low level of population density during the unsettled conditions of the late second and early first millennia B.C. But the resurgence that followed was even more substantial and rapid than on the central Euphrates floodplain (see table 16).

As might be expected in view of its original position of greater exposure to Assyrian and Elamite incursions, the Diyala region appears to have undergone a wider and more rapid oscillation between abandonment and resettlement. The sixfold growth in the number of sites of all sizes between Middle Babylonian and Parthian times was approximately twice as large as that occurring contemporaneously in the more central area between the Tigris and the Euphrates. By the Parthian period the proportion of Diyala settlement that may be defined as

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TABLE 16 Comparative Data on Lower Diyala Settlement Distributions, Middle Babylonian-Parthian Periods

Size Categories	Middle Babylonian	Neo-Babylonian-Achaemenian	Seleucid-Parthian
6 (200+ hectares)	—	—	—
5 (40.1–200 ha)	—	—	8
4 (20.1–40 ha)	—	—	3
3 (10.1–20 ha)	—	—	15
2 (4.1–10 ha)	1	7	38
1 (0.1–4 ha)	33	74	141

Source: Adams 1965, tables 15–18, slightly corrected to conform with site register entries in Appendix C. The originally separate Neo-Babylonian and Achaemenian tabulations have been combined. Although its position at the time cannot be plotted in detail (see below, p. 225), the Tigris is assumed to have followed approximately its known medieval course through the 'Ukbara or Ishaqi district north of Baghdad (Adams 1965, p. 91), rather than the line of its modern bed farther to the east. Hence this table also includes a few sites recorded in the Ishaqi area (Adams 1972) that appear likely to have been situated on the Diyala side of the Tigris.

urban was only slightly smaller than its midalluvium counterpart, even though as late as Achaemenian times it is not possible to identify a single urban site in the Diyala survey data.<sup>1</sup> For the whole alluvium, the impression of demographic trends that emerges—applicable, incidentally, to periods other than this one—thus is one of relatively greater continuity and a somewhat dampened cycle of growth in the core area, while the opposite held true on the peripheries. Yet we have seen that even in the core the extent of the transformation by the Seleucid-Parthian period was such as to introduce the distinct possibility of state-initiated schemes of urbanization and agricultural expansion.

There is one curious feature of the changing numbers of sites in different size categories for which no explanation is readily apparent. It emerges not from the above, very condensed tabulation but from the site-by-site records summarized in table 16. If we consider the Parthian sites, a higher proportion of those that were "urban" (20 out of 55, or 36 percent) than "nonurban" (68 out of 360, or 19 percent) continued to be occupied in Sasanian times on the same or an enlarged scale. That difference is not surprising; one would expect larger communities to exhibit a significantly greater continuity of occupancy. But this turns out not to be the case if we examine Neo-Babylonian or Achaemenian sites. The proportions are reversed: Only 6 out of 28 (21 percent) of the "urban" sites continued into the Seleucid-Parthian period, but 90 out of 266 (34 percent) of the "nonurban" ones apparently did so. Why should there have been a significantly higher mortality among the larger settlements than among

the smaller ones after the Achaemenian period? One could perhaps speculate about the purported association of Hellenism with the founding of new cities, but the Greek cities that can be identified were almost certainly of far greater size than the "urban" category as it is considered here. For the present, this unexpected reversal of pattern can only be set aside as an unexplained—but surely historically significant—anomaly.

The earlier trends in population and urban growth that have been described continued through most of the Sasanian period (A.D. 226–637). This was the apogee of the premodern development of the region in every economic as well as demographic respect, although we shall concentrate here only on population and urban variables. Once again, the basic data on the Sasanian settlement system within the central Euphrates floodplain is provided by archaeological survey. Because the ceramic chronological markers of the period are comparatively well understood (even if the absolute chronology still contains many ambiguities), a somewhat fuller quantitative specification of the extent of the system is possible than for most preceding periods. Aiding in this objective is the fact that Sasanian remains are both relatively recent and more extensive than those for any other period, for this means that their outer limits are rarely concealed by an overburden of later occupational debris. Table 17 accordingly provides estimates of individual site areas not merely in fairly broad size categories but in hectares.

For readier comparison with the conditions attained already by the Parthian period, however, it may be useful initially to summarize the Sasanian data in terms of the same categories used earlier. Recall that both in chapter 4 and heretofore in chapter 5 rough population estimates have been derived merely by taking the approximate mid-points of the size categories and regarding these as averages that could be applied to the categories as aggregates. This is also done in table 17 for purposes of comparison, but with the totals based on individual site computations provided in the adjoining column.

The averaged areas in most cases are tolerably close

TABLE 17 Numbers and Occupied Areas of Sasanian Sites by Size Category

Size Category	Number of Sites	Averaged Occupational Area	Measured Occupational Area
6 (200+ hectares)	1	200	230
5 (40.1–200 ha)	11	1,100	710.9
4 (20.1–40 ha)	22	660	586.9
3 (10.1–20 ha)	46	690	655.6
2 (4.1–10 ha)	141	987	898.8
1 (0.1–4 ha)	376	752	709.5
Totals	597	4,389 ha	3,791.7 ha

to the measured ones. Category 5 is the significant exception; major urban centers at least in this region and time period apparently were all grouped in the lower portion of the range. Even with this substantial discrepancy the sum of the differences is only about a sixth of the measured total. To compare aggregate settlement and population with that of the Parthian period, since no Parthian counterpart of the individually measured Sasanian site areas is available, the averaged total must be used for both periods. As I noted earlier, the figure of 3,201 hectares in the Parthian case is the one to be compared with 4,389 hectares in the Sasanian period. Thus there had been an increase of approximately 37 percent after the Parthian period. When we bear in mind that there had been extensive local abandonment of the southern part of the alluvium by late Parthian or early Sasanian times in connection with the apparent spread of swampy conditions there, including a major decline in one of the region's two largest urban centers (Uruk), the proportion of this increase is even more impressive.

A comparison with the maximum extent of settlement under the much earlier conditions outlined in chapter 4 is also instructive. Recall that the area of built-up settlement during the Ur III-Isin-Larsa period was 2,725 hectares, calculated on the same averaged basis as was employed in the center column above. Sites of the third and second millennia B.C. give the impression of being more nucleated than Parthian and Sasanian sites, possibly because their growth was often constrained by fortification walls, whereas in later periods defensive works were practical only for the larger cities. If this is so, whatever the reason, a direct comparison between the demographically and economically most advanced of the early periods and the apogee of settlement in the early Middle Ages is very difficult. On the one hand, equivalent sites may have housed somewhat greater populations during the earlier period. On the other hand, the earlier period is on the whole more likely to conflate successive developments under different political auspices, so that it may significantly exaggerate the population at any one time. Moreover, the surveyed region was in the very heart of Sumer in the earlier period, so that findings on population density there are likely to be near the maxima for the time. For the Sasanian period, however, the surveyed region was remote from any centers of even regional political importance.

Taking all these considerations into account, significantly greater population densities were to be found in the Sasanian period than during the Third Dynasty of Ur, more or less corresponding to the contrast between the suggested maximum settled areas of 2,725 hectares and 4,389 hectares—61 percent greater. At the most, one might want to accept the more accurately measured figure of about 3,800 hectares for the later period while leaving that for the period around 2000 B.C. unchanged, still in-

dicating a very substantial growth of population within a surveyed area of identical size. The effect of this increase in density was surely to require something closely approaching continuous cultivation over wide areas, and the computer simulation program originally worked out for prehistoric data in Appendix B to chapter 3 provides a graphic illustration of this is figure 36. Based on average site densities of 100 persons per hectare (as calculated from the rectangular coordinates of site measurement) and average requirements of 1.5 hectares of land per person, it converts recorded Sasanian site distributions and areas into a representation of the cultivated zone optimally located for the sites in question.

There is an exceptionally close correspondence between the limits of this simulated zone and the limits of the surveyed area itself, indicating that virtually continuous cultivation within large parts of the latter would have been necessary. The exceptions include a west central district (centering on the long-abandoned city of Isin) and one in the south (centering on Larsa, also long abandoned by the Sasanian period). The latter had been given over to swamps by this time, but in the former we shall find presently that there was a massive (if probably short-lived) Sasanian attempt at reclamation (below, p. 210).

The implication of figure 36 is that the uniform dark area would be extended in most directions, if conditions permitted surveys of intensity comparable to the present one to proceed in those directions. This underlines the real difference between the Sasanian period and earlier antiquity. As we shall see presently, it lay not so much in an early medieval increase in density as in an immense expansion of the cultivated area so that the total population of the alluvium was significantly larger.

Characteristic of the central Euphrates floodplain at this time was its declining access to the increasingly centralized levers of imperial power. This suggests that a different kind of comparison also may be instructive, with the Diyala plains immediately adjacent to the seat of Sasanian authority at Ctesiphon. Sasanian surface ceramics were not so readily identified at the time of the Diyala study as in the present one, and the need to conduct much of the earlier study in cultivated areas further affected the completeness of its findings. These differences probably cause a disproportionate reduction in the recorded number of smaller sites, slightly skewing the perceived settlement pattern in the direction of a greater apparent degree of urbanization. But, even taking this into account, the contrast between the urban hierarchies in the two regions is so substantial that it is surely significant. Considering only the number of settlements in each size category specified in table 17, the corresponding distribution for the Diyala region is as follows (From Adams 1965, table 18, with slight corrections from site register):

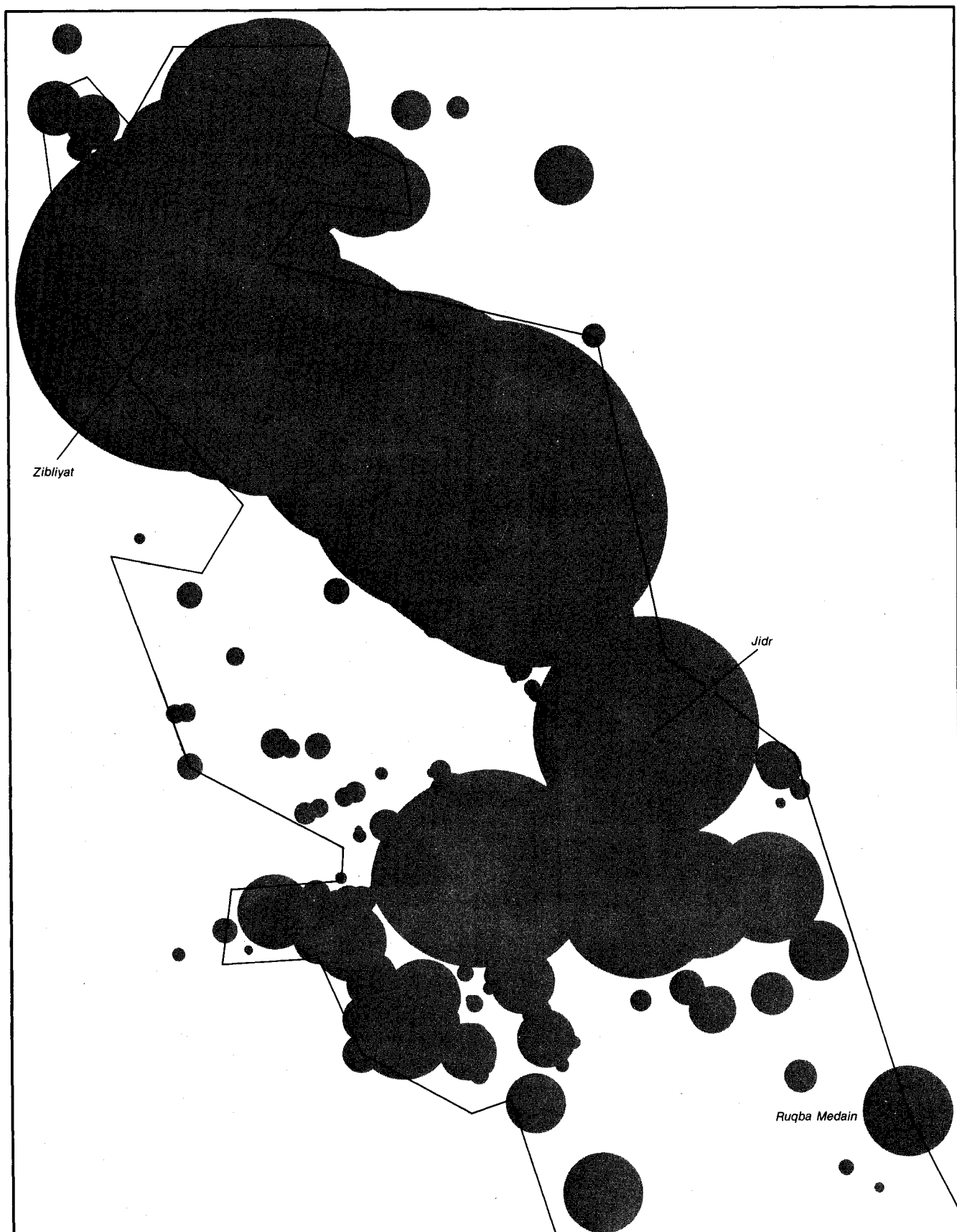


Fig. 36. Simulation of Sasanian cultivated area within the intensively surveyed region.

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6 (200 + hectares)	2
5 (40.1–200 ha)	12
4 (20.1–40 ha)	6
3 (10.1–20 ha)	31
2 (4.1–10 ha)	69
1 (0.1–4 ha)	174

The two topmost categories are slightly better represented on the Diyala plains than in the midalluvial region, while settlements falling among the lower four are more than twice as numerous as on the central Euphrates floodplain. Proximity to the political center thus was accompanied not merely by a higher degree of settlement nucleation but by marked population agglomeration in the larger urban categories at the expense of smaller urban centers, towns, and villages. It is quite uncertain whether average regional population density also was appreciably higher in the immediate hinterlands of Ctesiphon. Differences in survey procedures and effectiveness obscure this question, but in addition the land-use simulation given above appears to argue negatively. With so much of the land surface already under cultiva-

tion, appreciably larger populations could have been supported only if more intensive cropping systems were in use around the capital—or if there were a large net inflow of food from fairly distant regions. But a comparison of the lower Diyala and the midalluvium regions does support the existence, at least under the conditions obtaining in the Sasanian period, of a strong positive relationship between the degree of population concentration in large cities and political centrality.

The data in table 21 are graphically summarized in figure 37, a conventional histogram indicating site distribution by size for the intensively surveyed area during the Sasanian period. In spite of the great numbers of smaller settlements, only 42 percent of the total occupied area lay in sites of 10 hectares or less that are here designated “nonurban.” The arbitrariness of that definition is made apparent by the absence of clear breaks in the long “tail” extending to the right on the histogram until a much higher figure is reached. The first broad gap strongly suggesting a meaningful discontinuity, in fact, is that between 35 and 45 hectares. Size alone is a quite inadequate basis for distinguishing functionally differ-

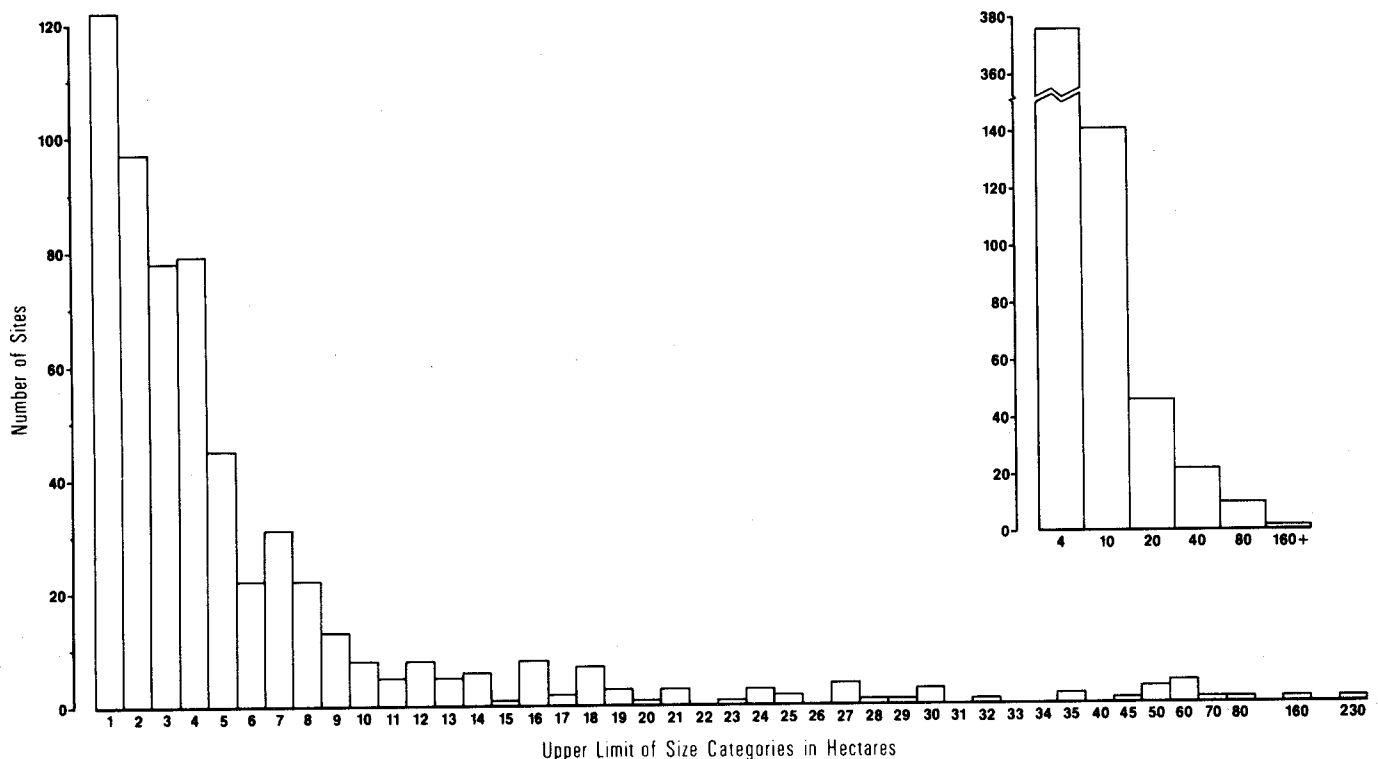


Fig. 37. Size distribution of Sasanian sites.



entiated tiers in an urban hierarchy, but at present there is no other information available with which to supplement (or replace) this criterion.

The very broad size distribution of the larger sites composing this "tail," surely most or all of them urban by any reasonable definition, is perhaps the most impressive feature of the Sasanian site hierarchy. It suggests the vigorous, strongly differentiated development of town life throughout the region, rather than a pattern of concentration around one or a few major centers of power. That description recalls our earlier discussion of urban "primacy," a condition in which Uruk, then the largest city, substantially exceeded its normal place in the rank-size logarithmic succession of cities constituting a single system (above, pp. 72–75).

A rank-size distribution of the Sasanian data is plotted in figure 38. The top of the graph may roughly approximate a normal distribution, but the bulk of it, applying to all but a few of the largest settlements, is convex and thus is the opposite of a condition of urban primacy. To repeat the characterization of the "flattop" morphology of this curve that was given earlier, it is "indicative of very imperfect integration at the level in question" (Skinner 1977, p. 241). The proliferation of smaller urban centers in the histogram thus should be understood as being only very loosely connected with the major centers, as if they were largely unaffected by centralized im-

perial policy. I will show presently that this is entirely consistent with what is known of the regional economic and administrative history of the Sasanian period.

The maximal development of these patterns has been described merely as Sasanian, but it would be misleading to characterize the whole period of the dynasty as one in which these maximum limits were consistently approached. Insofar as the surface collections allow us to differentiate early and late subperiods, the latter are clearly preponderant throughout the intensively surveyed region. On historical grounds, too, there is reason to place the fullest growth of Sasanian urban settlement—and the agricultural system that sustained it—in the early to mid-sixth century A.D. Then in the late sixth and early seventh centuries there probably was a sharp reversal, although this cannot yet be detected in the findings of surface reconnaissance. The full Sasanian achievement, in other words, is likely to have been of strictly limited duration. Moreover, many elements in the ensuing long decline almost certainly antedated the Islamic conquests. Although obviously not independent of political, religious, and ethnic factors, the cycles that are discernible in the waxing and waning of settlements do not conform closely with the traditional chronological divisions assigned to successive empires.

Although the onset of the reaction probably preceded the Islamic period, it is in the succession of Islamic settlement patterns that we find the most compelling evidence for an exceptionally broad and deep reversal. The ceramic surface collections permit a succession of phases of settlement to be identified fairly unambiguously. As is discussed more fully in the appendix to this chapter, there is much less certainty about the absolute dating of these phases. Perhaps most difficult to identify are remains of the first century or so after the conquest. By the mid- or later eighth century A.D., a variety of new glazed wares were making their appearance, attesting occupations during the heyday of the 'Abbasid Caliphate. Perhaps to be considered also under the latest part of the "Early Islamic" rubric are splash-glazed "classic" sgraffiato styles. Usually associated with the brief floruit of Samarra as the 'Abbasid capital (A.D. 836–92), small numbers of sherds of this type distinguish a subset of Early Islamic sites that may have continued for some time into, and probably even through, the tenth century. Subsequent to this, corresponding roughly with the late 'Abbasid period, is a phase here designated as Middle Islamic. Finally, Late Islamic is defined for present purposes as beginning with glazed styles associated with the Ilkhanid period (A.D. 1258–1410).

Table 22 in the appendix to this chapter details the occupations that may be assigned to these successive phases site-by-site. The summary statistics in table 18, drawn from this longer table, make the astonishing extent of the decline more apparent. As is explained in the

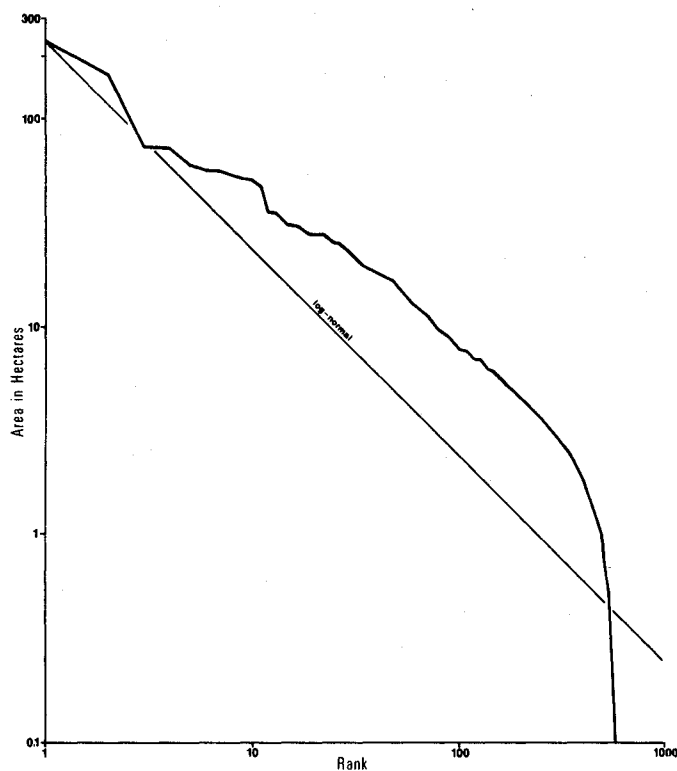


Fig. 38. Rank-size distribution of Sasanian settlements.

# Culmination and Collapse of an Agrarian Base and Urban Superstructure

TABLE 18 Numbers and Periods of Occupation of Islamic Sites by Size Category

Size Category	Sasanian	Early Islamic			
		Early Islamic	Early Islamic + "Samaritan"	Middle Islamic	Late Islamic
6 (200+ hectares)	1	—	—	—	—
5 (40.1–200 ha)	11	4	—	—	—
4 (20.1–40 ha)	22	7	1	1	(1)
3 (10.1–20 ha)	46	22	2	4	5
2 (4.1–10 ha)	141	76 + (3)	13	9 + (3)	19
1 (0.1–4 ha)	376	173 + (73)	21	26 + (31)	52 + (19)

appendix, there is a good case for adding the fairly large group of provisionally attributed sites (shown in parentheses) to the totals given in the Early Islamic column. On the other hand, it is doubtful if more than a handful of the provisional sites shown in the Middle and Late Islamic columns may be added to the totals indicated there.

Even if one takes fully into account all the sites that are only provisionally attributed to the Middle Islamic period, these figures show that by the eleventh or twelfth century the total occupational area had shrunk to only about 6 percent of what it had been a half-millennium earlier. Urban life on a substantial scale of course still continued in other parts of the Mesopotamian alluvium, but in this central region only four sites, none exceeding 20 hectares in size, were left that fall within the urban category as here defined. The Late Islamic column suggests a modest resurgence of settled life after the thirteenth century, but earlier trends can only be described as a prolonged, precipitous decline.

Some clarification of the nature of the change may be gained by comparing the Sasanian and Early Islamic columns, the only ones with enough entries so that a regional trend can be described with considerable confidence. There was an aggregate loss of about 55 percent of the Sasanian settled area, but the decline was not uniform. The reductions for each settlement size category between Sasanian and Early Islamic times are as follows:

6 —100%	3 —52%
5 —64%	2 —44%
4 —68%	1 —35%

According to these figures there was some reduction in every size category, but losses were in general much greater among the larger settlements. The decline in the smallest two categories was in fact fairly modest. It seems to reflect little more than the loss of settled area owing to the progressive growth of swamps in the southern part of the region (cf. figs. 45 and 48), while the abandonment of the major towns was a geographically less localized process. This may suggest that the Islamic conquest was followed by large-scale population movements away from

the region, possibly in the direction of newly founded urban centers like Basra, Kufa, and Wasit. Generalized attrition, whether politically or environmentally induced, seems to be ruled out as a cause by the differentiated nature of the abandonment. Much of the rural population seems to have remained in place, and it appears that the propensity of the urbanites to drift toward the new Islamic foci of prosperity and power was roughly proportional to the size of the urban settlements with which they were already familiar. However, this plausible but quite speculative reconstruction cannot be supported by specific textual references to the settling of large numbers of non-Arabs in the new garrison cities. Except for the extensive colonization of the Basra region about the end of the seventh century, the sources speak of non-Arab urban immigrants solely in terms of defecting military units and captives (Morony, pers. comm.). And, unfortunately, the limitations of archaeological surface collections as a means for dating abandonments makes it impossible to specify the processes involved more exactly from the other direction. A shift occurring within a few decades would have been so abrupt that it would hardly escape the notice of the chroniclers, but the shift to be observed in this instance could equally well have been a less perceptible one that continued for more than a century.

In any case, as a result of the selective abandonment there was a shift of the balance in the direction of rural agriculturalists. The latter, for the first time since the Middle Babylonian period a millennium and a half earlier, emerged once more as dominant population component. After a period of no more than a few centuries during which the population approximated that of the Neo-Babylonian and Achaemenian periods in the early stages of the upward cycle of growth, it plunged to a level of less than half what it had been even during its Middle Babylonian nadir.

We must bear in mind, however, that the data thus far marshaled in support of an irregular but progressive withdrawal apply only to the old urban heartland in the central Euphrates floodplain. The question is, How representative is this of trends elsewhere? There is no doubt of a general fall in population throughout the entire region if we extend the temporal scope of the discussion to include the later years of 'Abbasid misrule and the destructive Ilkhanid onslaught that followed. But this already implies that in some districts the decline proceeded much more slowly than in others, and that it may have been completely arrested or even reversed for considerable periods. Such is particularly likely to have happened around the newly founded Arab cities, and especially in the sustaining area on which after the mid-eighth century the growth of Baghdad must have largely depended.

Yet even around Baghdad the immediate impact of the Islamic conquest seems to have been a considerable disruption of settlement patterns and an associated decline in

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population. At least for the lower Diyala plains to the north and east, the transition between Sasanian and Early Islamic times was accompanied by the following changes in number of sites in each settlement size category (From Adams 1965, tables 19–20, including only pre-Samaritan sites from the latter, slightly corrected to conform with site register entries):

6 –50%	3 –26%
5 –58%	2 –41%
4 +12%	1 –35%

There are unexplained anomalies if this tabulation is compared with the foregoing one. Smaller urban centers, those in categories 3 and 4, either fell behind the general trend or reversed it completely.<sup>2</sup> But it is fairly clear that the large Sasanian centers were once again in this case more vulnerable than the small settlements presumably devoted largely to agriculture, although the differences were less pronounced than they were farther south. Comparison of the table and the map for the period (fig. 51) suggests, furthermore, that much of the reduction in the number of small settlements derives not from a general process of widespread attrition but from localized pockets of abandonment. Granting the incompleteness of our data and its probable unrepresentativeness as a detailed account applicable to the whole alluvium, the rough similarity of trends in two large, differently situated regions does argue strongly for a more or less massive demographic decline during the half-millennium or so after the beginning of the Islamic period.

To recapitulate briefly, the settlement data to which this section has been devoted trace out a curve that ascends to a climax in the late Sasanian period and then fails more abruptly to the lowest level in almost five millennia. To be sure, there is ample reason to doubt the smoothness of the cycle. Doubtless the broad periodization we are forced to use obscures many short-term oscillations related to conjunctures of ecological, political, and economic events and policies. These may well have been the only reality of which the population at large had any conscious awareness. But the longer cycle was no less real for lack of popular recognition. It encompassed not only a burgeoning and then catastrophically declining population but a cycle of urban growth and abandonment that sensitively responded to, and even amplified, the swings in population.

The problem of the unrepresentativeness of our data must be mentioned once again in concluding this overview of population trends over a span of a millennium and a half. A comparable sequence of change for the lower Diyala region greatly reduces the possibility of serious misinterpretation and has been included above partly for this reason. But a series of at least modest surprises is all but certain until the entire alluvium has been systematically

surveyed. Note has repeatedly been taken of a tendency for the intensively surveyed region to become politically more marginal than it had been in earlier antiquity, perhaps as a consequence of the westward movement of the Euphrates away from the older cities on the central floodplain that has been documented already in chapter 4. It also remains to evaluate, insofar as possible, the quantitative implications of the survey findings with the aid of relevant textual sources. But the archaeological evidence for an underlying cycle involving a sevenfold rise and even more complete collapse transcends what can be even potentially confirmed at every point by largely accidental congeries of texts. It also transcends the many uncertainties over the timing of this cycle that are associated with dependence primarily on archaeological surface collections for dating. In that sense the archaeological evidence is not ancillary to traditional epigraphic and even historical studies but precedes them, providing an orientation for interpretive efforts rather than merely assisting in them. This, at any rate, is the conscious spirit in which it is only candid to admit that the present synthesis is undertaken.

### CHANGING AGRICULTURAL AND FISCAL MANAGEMENT

A frustrating but unavoidable feature of employing archaeological and textual evidence in a common framework is that they can seldom be made fully congruent. In this case, generalizations have emerged from an archaeological survey that can only very hesitantly be applied outside its stated boundaries of intensive coverage. Archival sources, in the meantime, rarely if ever even touch on the same set of demographic and settlement generalizations. All too frequently, moreover, they are so laconic as well as incomplete that it is tempting not to move very far beyond the mass of particulars to which they are devoted. Where generalizations were ambiguously articulated in the ancient sources themselves, as in some of the early Arab accounts of fiscal and agricultural policies, their significance for the archaeologist is reduced by our inability to reproduce the geographic boundaries within which they were thought to apply. If we are not to sink to the mere enumeration of uncoordinated bodies of data, in other words, we are compelled to concentrate upon a few, fairly abstract but crucial areas of potential linkage—and then often to approach even those areas tentatively and indirectly.

#### *The Neo-Babylonian and Achaemenian Periods (ca. 700–330 B.C.)*

There is no ready means of avoiding these limitations for the earlier part of the long historical epoch dealt with in this chapter. Neo-Babylonian, Achaemenian, and Seleucid cuneiform sources, to be sure, do exist in profusion.

Many still await publication, but even those that have received comparatively detailed study are of little assistance on rudimentary matters like the scale of the agricultural economy.

The importance given to Babylonia in Achaemenian royal titulary, and the choice of Babylon as the dynasty's winter residence down to the time of Xerxes, surely indicate that great political or symbolic importance was attached to it during at least the initial decades of Achaemenian rule. Only a major center of production would have been in a position to provide one-third of all the Asian tribute the great king received, or the unparalleled tribute of one thousand talents that Herodotus (1.192; 3.93) claims was levied on it. But the currency of Babylonia's prominent place in the titulary outside Babylonia itself is open to some doubt, so that this may have been little more than a calculated bid for local support. Some uncertainty is also justified over whether the deliveries of tribute were regular or merely exemplary. Moreover, translating aggregates said to derive from an undemarcated large region, only part of it archaeologically surveyed, into specific densities of land use from which they were extracted by taxation or various other forms of forcible transfer is a challenge not easy to meet. For all of the generalized praise that Xenophon (*Oeconomicus* 4.8–15) heaps on the quality of agricultural management in what must be Babylonia, making clear that there was some level of direct royal involvement in making agricultural improvements, the realities of economic life remain elusive.

The so-called Murashu archive from Nippur allows us to approach the problem from the other end. Not immediately relevant are the wide-ranging economic activities and institutional interrelationships of this powerful firm, both on its own behalf and as a subsidiary crown agent that leased and then undertook the subleasing of land, water, seed, draft animals, and other factors of production. But much information is conveyed in passing on agricultural if not demographic questions. The difficulty lies in determining the representativeness of this information. Oppenheim (n.d.) has suggested that the Achaemenian rulers "created . . . what might be called a project of internal colonization in the region of Nippur, which was to become the economic capital of the satrapy." His interpretation is supported by the existence in the vicinity of large estates belonging to members of the royal family and other high Achaemenian officials (e.g., Dandamayev 1969, p. 306). If correct, it implies that the local economy may have been more substantially altered as a result of royal policies than any other part of the Mesopotamian alluvium except perhaps the immediate vicinity of Babylon. But so large a proportion of the available texts are from Nippur that little can be said with any confidence about its similarities to or differences from other regions. Stressing the resulting uncertainty, Oelsner (pers. comm.) finds

it inherently more probable that the position of Nippur was essentially typical for important towns of the period than that it was exceptionally favored.

The quantities and varieties of produce testify to the vigor of the agricultural regime in which the Murashu firm played an important part. Barley and wheat continued in their traditional major roles, but there are also numerous references to spelt, millet, sesame, onions, and pulses. Flax, too, may have been grown on an extensive scale, a new development suggested by references to it in Murashu tenancy contracts. As Oppenheim notes, "this information must be combined with the remark in Strabo's Geography XVI 1, 7: 'Borsippa . . . manufactures linen in great quantities,' all of which is in keeping with the sometimes astonishing quantities of linen (21,600 units called *qatu*) mentioned in the linen weaver's account Nbn. 164" (1967, p. 251; note that a line is supplied here that was inadvertently dropped in the original publication). Figs are not attested, and there is only one reference to the cultivation of grapes, but dates were cultivated on a very large scale. At their maximum for a single year the obligations to the firm included one for 20,000 *kur* (30,000 hectoliters) of dates, equivalent to 350 kilograms of silver. Another title to 11,270 *kur* implies that the debtors had the usufruct of a similar number of palms, since one *kur* was about a palm's average yield (Cardascia 1951, pp. 2, 18). To judge from the average density of about 300 palms/*kur* (227/hectare) within orchards near Uruk at about the same period, their holdings would have been not less than 50 hectares. Date orchards more than six times as large were common in the Uruk region, truly massive units of intensive land management (Cocquerillat 1968, pp. 22, 32, table A).

Reflecting the new emphasis on specialized intensification and productivity were steeply increased rates of seeding. The most common rate in the Ur III period, a previous era in which many policies tended toward maximization, had been about 55.5 liters of seed per hectare of barley (above, p. 151). Now it moved to 112.5 liters in the Uruk area (Cocquerillat 1968, p. 28), and to 133.3 in the vicinity of Nippur (Jacobsen 1958, p. 44). Yields seem to have increased accordingly, from an average of less than 1,200 liters per hectare during the Third Dynasty of Ur to about 1,575 around Uruk and to an "expected minimum" of 2,000 liters around Nippur. For these figures to be maintained—if indeed they were maintained—close attention to irrigation schedules would have been needed in order to avoid excessive irrigation and the rapid onset of salinization.

And there were developments that may be related to improved irrigation controls as well as to the increasingly intensive character of the entire agricultural regime. Although the details are obscure, according to Oppenheim, "the fact that two harvests are reported indicates the size and the reliability of the water supply provided by the new

irrigation installations and, still more important, by new techniques. The use of novel terms such as *GIŠ.APIN* and *šilibtu* 'sluice gate' may indicate technical innovations that made better utilization of the available water possible" (Oppenheim, n.d.; cf. Cardascia 1966).

Water was one of the more expensive factors of production in the Murashu firm's operations. In one case a group of landowners are reported to have had to give a third of their crop as well as moderate payments in silver for the use of water from a royal canal for only three days a month (Dandamayev 1969, p. 307). Land was acquired from a variety of property holders, but water rights came exclusively from a distinct branch of the royal administration. Based upon a comparison of leases with and without water rights, it has been suggested that annual rental fees generally were as much as 70 percent higher in the former case. Canal frontage may, in fact, have been the significant entry in royally maintained land registries, in which military service was a condition of the tenure of fiefs, and royal involvement in the irrigation system is also suggested by the naming of judges and fiscal officials who were responsible for canal districts (Stolper 1974, pp. 44-45, 49, 61). Clearly, the crown recognized not only its potential monopoly in this area but a valuable source of administrative leverage, and it had not been slow in moving to take advantage of both. What is less clear, probably because the records of the irrigation administration have never been recovered, is the extent to which the crown itself was responsible for the improvements in the system rather than merely benefiting from them by right of conquest.

This uncertainty extends beyond the leasing of water rights, for there is something perplexing about the relative costs of all the factors of production. Land was apparently the least of them, although generalization is made difficult because leasing contracts fail to deal with gradations of quality—and frequently also to specify area as well as price. Its annual costs appear to range between  $\frac{1}{2}$  *kur* and 1 *kur* (150 liters) of barley per *kur* (1.324 hectare) of field devoted to that crop. At the most, this is considerably less than 10 percent of the amount that would normally be harvested. Date orchards, similarly, apparently were priced at very low levels. In an example from Nippur the annual rent in silver on a *kur* of orchard was only fifteen shekels, the average value of the produce of only fifteen trees when three hundred trees were to be expected in that area. Even at the upper limit thus far known, an example from Uruk, the average produce that might be expected from only forty palms covered the rental of an orchard with three hundred trees (Stolper 1974, pp. 191-93; Cardascia 1951, p. 2; Cocquerillat 1968, pp. 32, 38).

By contrast, the rental of the draft animals and plows and harness with which to work the land was exceedingly expensive. The annual cost of an unequipped ox ranged

from 10 to 25 *kur* of barley, that of a fully equipped ox up to 37.5 *kur*. Since a sixth century Uruk text shows that 25 plows and 100 oxen were needed to work 625 *kur* of land, the cost to the tenant of plows and draft animals usually ranged upward from four times the rental of the land itself. Relative to these seemingly "supplementary" charges for water, oxen, and equipment, Stolper is certainly right in terming the basic cost of land "so low as to be negligible" (1974, pp. 194-95; Cardascia 1951, p. 136; Cocquerillat 1968, p. 42).

What again remains unexplained is the basis for relative restriction of access, to draft animals as well as to water, that maintained this pricing structure for a considerable period. The feudatories of the crown as well as other landowners were placed in the position of deriving income only from the least valuable, almost "negligible" factor of production, while the crown as well as the Murashu firm was able to benefit from the whole repertoire of them (Stolper 1974, p. 200). Cardascia's and Oppenheim's speculation that *GIŠ.APIN* refers to irrigation machinery would offer an attractive solution to the problem. With the spread of some new lifting device, the demand for draft animals might well outrun the supply at least for a time. But whether the term has this meaning or instead merely refers to some type of plow is still a matter of debate.

Stolper's argument is compelling, that "the evident cheapness of land in the Murashu texts can be taken to reflect its availability in increasing supply; while the high cost of canals, livestock, and equipment may be held to reflect competition for scarce factors needed to exploit and develop new lands." The Neo-Babylonian and Achaemenian periods were, in other words, "times of slow but distinct expansion of population and resettlement of long-abandoned territories" (Stolper 1974, p. 199). But some account must also be taken of a factor of coercion—that is, that relative costs were administratively imposed rather than arising from the free play of supply and demand in something approximating a "market." Without some other, as yet unrecognized set of constraints, for example, it is not clear why low land rentals should have been accompanied by the striking increase in seeding rates that has already been mentioned. If the impetus lay with the state, was the maintenance of this price structure somehow related to the crown's well-known propensity to amass a hoard of silver and other treasures for larger imperial purposes (cf. Altheim and Stiehl 1963, 1:120)? If instead (or also—the alternatives are not mutually exclusive) the impetus lay with local landowners, was their objective possibly to economize on the use of expensive draft animals? Maintenance of existing, extensive rather than intensive, cultivation practices by renting additional lands at very low cost would have been the obvious alternative. Even water costs would not necessarily have increased if the same canal frontage was maintained and the

depth of cultivation was merely extended farther down the levee backslopes.

Water costs and management are perhaps the key to the riddle. If they were linked by the state to canal frontage, then expansion into new areas along long-disused levees incurred steeply rising costs for water. Deepening the belt of existing cultivation was also possible, but the closer the farmer approached the backslope depressions the greater were his losses from waterlogging and salinity. By hugging the crests of the existing levees already served by canals, increasing his seeding rates, and rationalizing his methods and schedules for the application of irrigation water, he maximized his production under the existing institutional arrangements.

What I am groping toward, but admittedly do not have the evidence to reach at this juncture, is an application of the concept of marginal utility. This is not at all to deny that the exceptionally low price of land must be tied in some way to a "surplus" of it and hence to relatively low levels of population. But is it not possible that the Murashu firm generally dealt with lands that were only marginally suitable for new agricultural investment, either because of the high cost of development and water or because of increasing salinity? If so, it would be a mistake to generalize from the Murashu records, valuable as they are, to the conditions facing the society as a whole.

The tantalizing lack of correspondence between even a well-studied, highly illuminating archive like this one and the broad demographic and settlement concerns of an archaeological reconnaissance is thus emphasized once again. There is a broad but vague implication in the documents of rising population levels that were still well below the carrying capacity of the land, and of an orientation of state policies as well as of agriculturalists' decisions toward an expansion of production not only through intensification of the agricultural regime but through its territorial expansion. Numerous canals are mentioned by name, together with their adjoining settlements (Cardascia 1951, pp. 2-3), some of them obviously those that have been merely identified by number in the archaeological survey. But names and numbers are exceedingly difficult to align with one another on the basis of the available evidence, and they are likely to remain so for as long as excavators avoid the smaller, less "promising" mounds and confine their attention to a handful of traditional centers like Nippur and Uruk. Many activities and relationships that would be essential to a real understanding of the system, above all those concerning the coercive powers and prerogatives of the state, are naturally beyond the reach of the archaeologist alone but are even left unspecified and hence elusive in the texts.

This is not to deny the value of certain general correspondences between the textual and the archaeological pictures. Figure 39 sets forward the latter for the intensively surveyed area, and a comparison of Neo-Babylonian-Achaemenian with Middle Babylonian (fig. 35) settle-

ment confirms that the earlier enclaves had undergone lateral extensions in virtually every direction. Similarly, the converging line of evidence for a rising population during these periods that derives from surface reconnaissance has already been presented in the preceding section, although with serious reservations about the absolute chronology of the archaeological observations that considerably reduce its confirmatory relevance.

Another suggestive element of correspondence concerns the general pattern of the watercourses that is shown in figure 39. It must be admitted that the position of individual components of the system generally has had to be reconstructed from overlying levees of Parthian or Sasanian date. But given the greater extent and density of subsequent settlement, it is to be expected that very few canal traces will have survived that are unambiguously (i.e., exclusively) datable to the earlier periods. In any case, the figure appears to indicate a marked shift away from earlier patterns.

As exemplified by both the Cassite and the Middle Babylonian maps, earlier layouts tended to involve linear arrangements of sites along parallel, rather widely separated canal or river branches that were connected only at long intervals. What the Neo-Babylonian and Achaemenian systems exhibit, by contrast, is an interlocking, much more "artificial" grid of watercourses that broke large, contiguous areas of cultivation into polygons of fairly uniform size and shape. In the older pattern one must assume that a fairly broad uncultivated band was left between the parallel branches, while the new, more tightly arrayed polygons suggest that fairly broad expanses of continuous cultivation had begun to be introduced. Precursors of these zonal lattices may have been introduced as early as the Third Dynasty of Ur (cf. fig. 31) but had not survived the political vicissitudes of the following centuries. At the least, therefore, they were now reintroduced after a long absence, and on a considerably expanded scale.

The significance of the new pattern is to be found by looking not backward in time but forward to later periods. For the Sasanian and Islamic periods the largely complete network of surviving canal levees makes it clear that the entire system had been closely and purposefully interdigitated. As a result water supplies could be shifted from any major branch to any area in need virtually at will, surely providing for more adequate, secure irrigation in a variety of contingencies. The new pattern is to be seen, in other words, as an essential part of the expansion and intensification of agricultural production that has already been associated with the Neo-Babylonian and Achaemenian periods by scholars concentrating upon the cuneiform texts.

Other questions on which there is at least some potential complementarity between the archaeological and

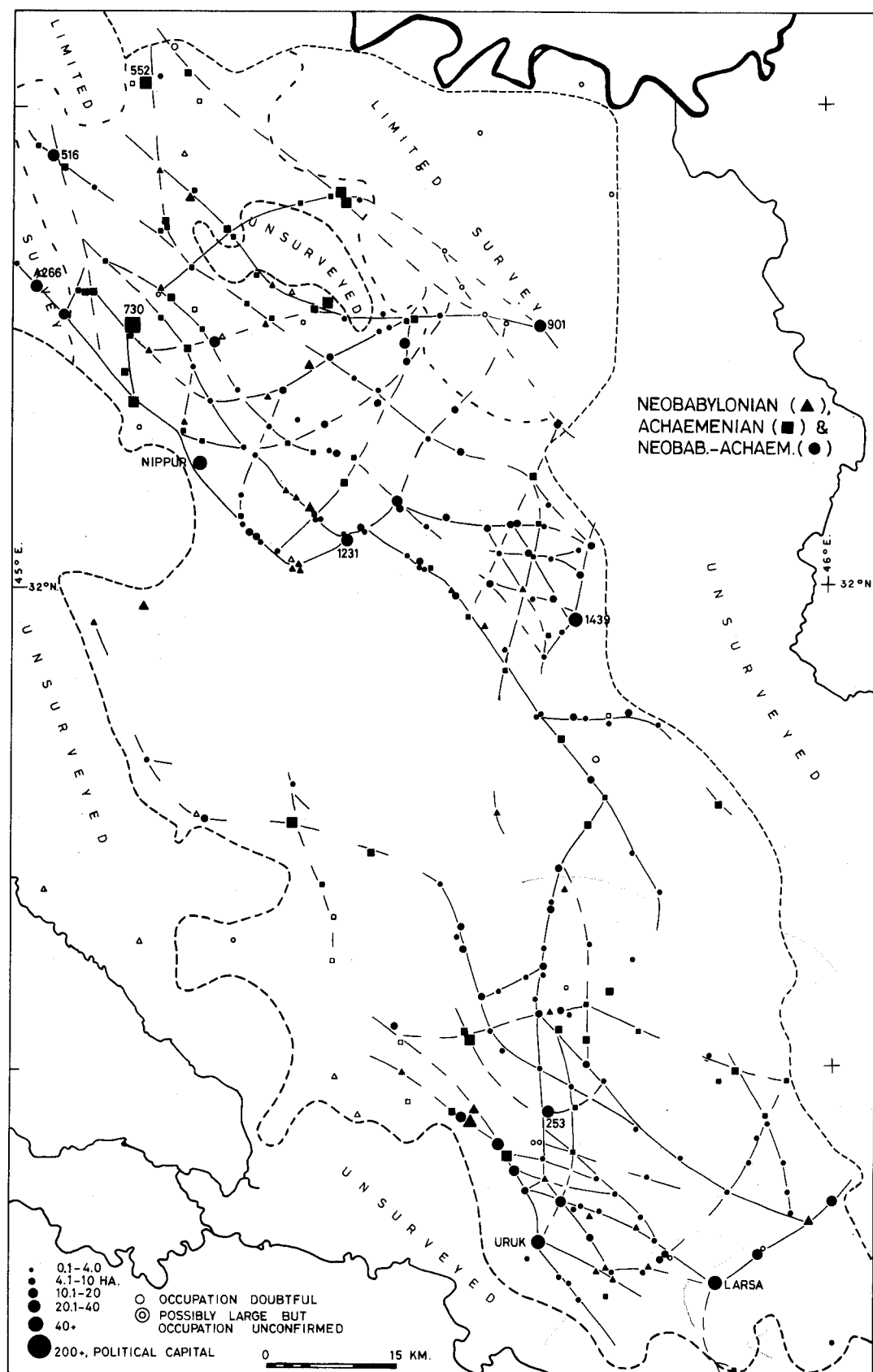


Fig. 39. Neo-Babylonian-Achaemenian period settlement patterns.

the textual evidence are of a more "contextual," wide-ranging geopolitical character than those heretofore discussed. Systematic surface reconnaissance, with its relatively limited zone of coverage, is not well suited to contribute to such an approach. Even though less complete and probably less precise in its attribution of periods of occupation, the smaller-scale map in figure 40 that includes most of what is known in all of Babylonia provides a better basis. For the Neo-Babylonian and Achaemenian periods consideration should be limited to only those sites accompanied by the numbers 2 and 3.

There is an obvious source of uncertainty in the great lacuna south and southeast of Babylon. Some reconnaissance coverage has been obtained in that region, but its effectiveness was sharply reduced by recent heavy alluviation and by a mosaic of difficult topographic conditions including swamps, cultivation, and interspersed patches of dunes. Surely Babylon's enormous size and political preeminence during these periods would have led to attempts to develop this region immediately downstream of it, even though the consequences are not apparent. Whatever developments may have taken place there, however, appear to have had little if anything to do with the economic and demographic resurgence of Nippur and a large surrounding region much farther to the east and southeast.

The watercourses serving Nippur and its hinterlands may have been regarded either as full-fledged branches of the Euphrates or merely as canals following the levees of former Euphrates branches, but at least the major ones preserved the general northwest-southeast orientation of earlier times. To be sure, there is reason to believe that a Neo-Babylonian canal of some importance was constructed running east from immediately north of Babylon to serve the environs of Kish, and it may well have been extended farther to intersect with one or more of the old parallel channels that approached the Nippur region from the northwest (Gibson 1972, fig. 13; Adams 1972, maps 1F, 6). We are handicapped in estimating how far this new watercourse may have reached during the periods in question, since the crucial area for determining that lies in a kind of interstice west of the zone of this intensive survey and beyond the eastern perimeters of coverage of the Kish and Akkad surveys. But at least there is nothing to suggest that the new channel supplanted the older ones and led to their abandonment.

The continuing economic independence and viability of the more easterly region is also suggested by the considerable efforts that were made to restore the former connection between Nippur and Uruk, which had been interrupted in Middle Babylonian times and perhaps during the Cassite period as well. With all due caution about leaping to geopolitical conclusions from mere canal alignments, the picture is not one of Babylon's complete hegemony and the corresponding subservience of regions farther

east. In that sense it may lend some support to Oppenheim's suggestion that Nippur served as a kind of economic capital of the Babylonian satrapy, at any rate in the later Achaemenian period after extensive destruction in Babylon in the time of Xerxes (486–65 B.C.).

Uruk, on the other hand, seems to have had a more direct connection with Babylon. Survey is lacking in much of the intervening terrain, but the LANDSAT imagery (fig. 6) suggests the existence of a broad old levee from Borsippa to Uruk, and even continuing southeast across the present lower course of the Euphrates into the vicinity of Ur, that is very likely to go back to Neo-Babylonian or Achaemenian times. Perhaps this more direct connection helps explain why there were Uruk temple holdings in the territories of upstream towns like Marad and Sippar, and holdings around Uruk in the case of Sippar (Cocquerillat 1968, p. 35). Nippur lay closer at hand, but its influence over southern Babylonia may have been supplanted by Babylon and other towns to the west during the long period when the canal connection between them seems not to have been functional.

An additional factor involved in Uruk's geographically extensive influence must have been the great herds of animals that were administered by the temples there. In the case of the Eanna Temple, surely one of the largest landed economic establishments of the time, it has been estimated that during the reign of Cambyses (530–22 B.C.) its holdings included as many as 150,000 animals—principally sheep and goats, but also cattle, donkeys, and smaller numbers of other species. Often dependent on stall-fed fodder for part of the year, these herds at other times ranged into northern Babylonia and even across the Tigris (San Nicolò 1948, pp. 277, 285). Primary attention in the foregoing pages has been given to field and garden cultivation, largely because this was the principal concern of the archival sources dealt with earlier. The Eanna texts make clear, however, that the Babylonian economy continued to comprise an essential balance of cultivation with husbandry. And, equally important, they suggest that the foraging requirements of the herds must be seen as one of the most durable, widely ramifying, and effective forms of interregional articulation.

One additional observation can be made on the basis of figure 40. There is nothing to suggest that a network of canals ran southeast from the district immediately surrounding the cities of Seleucia and Ctesiphon, more or less parallel with the right bank of the main Tigris meander-belt levee, before the Seleucid-Parthian period. On the other hand, it will be observed that there is a group of Neo-Babylonian and Achaemenian sites beginning about 40 kilometers to the southeast. Again we encounter a lacuna in archaeological coverage beyond the limits of the intensive reconnaissance, but then there are suggestive groupings of sites (including, e.g., site 552) that may well have been connected with the others by a canal. This must



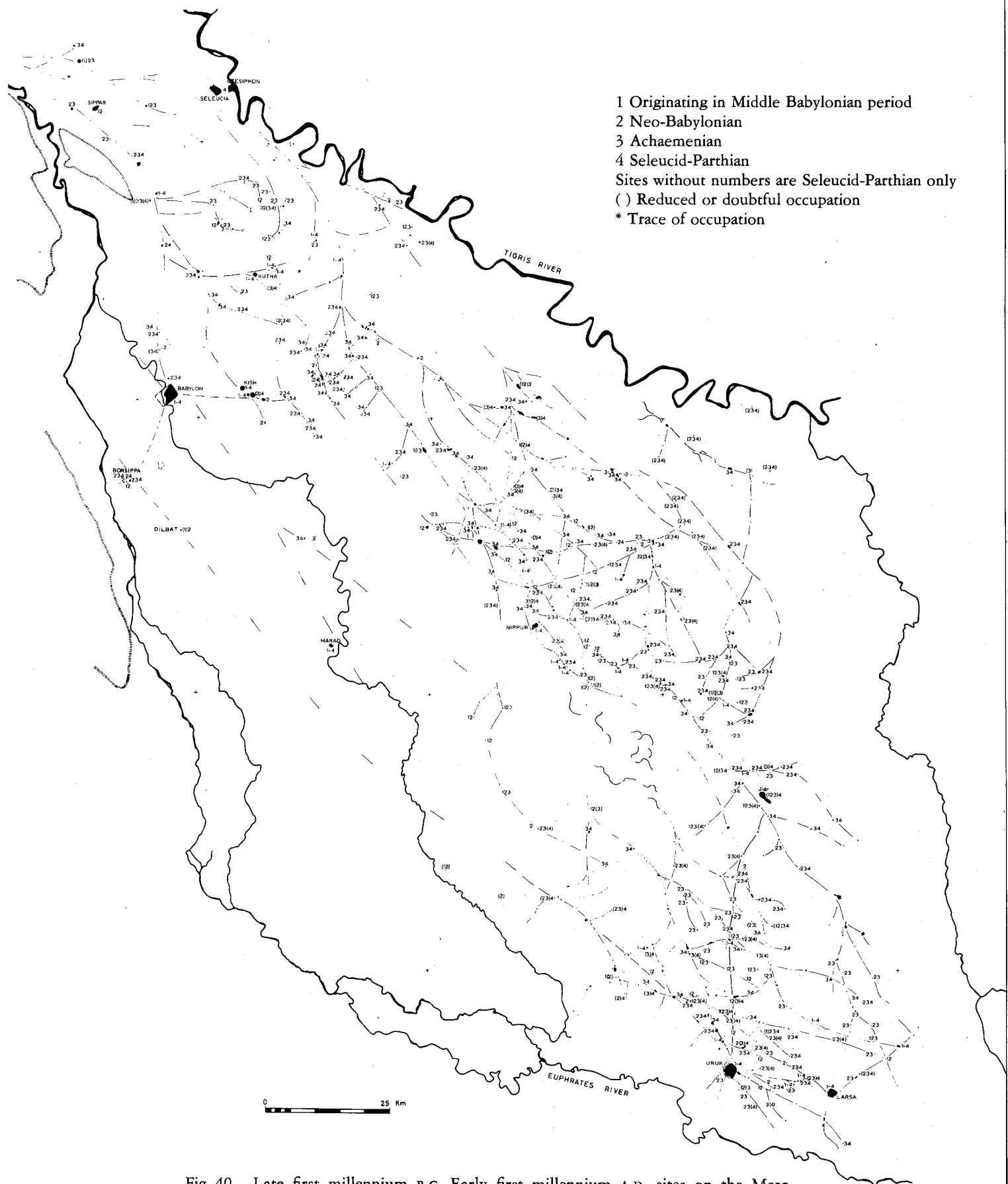


Fig. 40. Late first millennium B.C.–Early first millennium A.D. sites on the Mesopotamian plain.

indicate a major new initiative in either the Neo-Babylonian or the Achaemenian period directed toward employing the Tigris as an irrigation source. Its headworks probably lay in the vicinity of a little nineteenth century Arab fort and an extensive series of nearby ruins recorded by Collingwood as Kalat el-Buddah and the Gorgot mounds (Barnett 1963, fig. 4). One would expect that a substantial settlement, perhaps even on the scale of the ruins of Opis, might be associated with the main offtake of a major new canal system of this kind, but that is of course unsupported speculation.<sup>3</sup> At least for the present, what is more interesting is that the fundamental shift toward the Tigris as the main axis of trade, settlement, and communications—characteristic of all later periods—may have been foreshadowed even before the arrival of the conquering Greek army of Alexander.

North across the Tigris lay the lower Diyala plains, and I will conclude this consideration of Neo-Babylonian–Achaemenian irrigation and settlement patterns with a brief discussion of the more modest developments there. The relevant data on site size and location have been previously published (Adams 1965), but only with very generalized suggestions on what the accompanying watercourse patterns were. Rather than being derived from the conventional map series that served as a base for the original publication, with its exceedingly incomplete and occasionally inaccurate renditions of former canals and ancient canal levees, the watercourses shown in figure 41 conform with the ancient irrigation patterns that have been independently traced from the aerial photographs (fig. 8).

It is clear from this new mapping that the beginnings of a trend toward settling the right bank of the Tigris during the Neo-Babylonian and Achaemenian periods had no real counterpart on the left bank. A renewed growth of population and spread of settlement after Middle Babylonian times is just as evident in the Diyala region as farther south, but it does not appear to include new enclaves depending primarily on the Tigris for their irrigation water. Instead, the overall pattern is essentially the same as that found throughout the third and second millennia B.C. (Adams 1965, figs. 2–3), with settlements accompanying the numerous branching mouths—predominantly natural—through which the ancestral Diyala joined the Tigris.

In most other respects as well, the pattern shown in the accompanying map (fig. 41) provides no suggestion of changes to come. The two main upper branches of the Diyala lay in positions paralleling the present stream to the east and west, not greatly different from where they had been a millennium or more earlier. Even though there had been a substantial recovery of population levels settlement was still confined to villages and a small but more rapidly growing number of small towns. Nothing is to be seen like the polygonal arrangements of sites on

the central Euphrates floodplain at this time, with their large, probably continuously cultivated areas served by lattices of canals implying some degree of state initiation and management. As late as Achaemenian times the Diyala plains were still a provincial backwater, but they would not remain so much longer.

#### *The Seleucid-Parthian Period (ca. 330 B.C.–A.D. 226)*

An understanding of the strategic significance of the shift from reliance on one primary riverine artery to another is crucial before we take up the Seleucid-Parthian period and succeeding periods in detail. It is as a readily navigable connecting link between a series of administrative capitals and trade emporiums—Seleucia, Ctesiphon, Charax Spasinou, Forat, Vologasias, and Baghdad, to name only the most notable—that the Tigris gained ascendancy over the Euphrates.<sup>4</sup> The advancement of not merely riverine but oceangoing trade is implied as the dominant consideration behind the move, an encouragement of a rising tide of luxuries from the farther Orient partly for local elite consumption but especially for large-scale overland transshipment to the Mediterranean world. Only in the context of greatly expanded horizons of intercourse, in other words, is the shift comprehensible at all.

But with the development of a new main axis of communications primarily for that reason came a chain of consequences that could not have been anticipated. The topography of the upper part of the alluvial plain made easterly extensions of Euphrates left bank canals comparatively simple to construct, and the relative Tigris and Euphrates levels there permitted properly graded flow only in the direction of the Tigris. When Seleucia was first sited on the right bank of the Tigris, such an extension not only would have provided a fairly manageable urban water supply but also would have extended that city's command of routes of communications westward to the Euphrates. The major drawback of the Tigris had been that the ultimate destination of most of the imported commodities made transshipment necessary in order to have them follow the line of the Euphrates valley westward. When navigable waterways united the Euphrates with the Tigris near the upper end of the alluvium, that problem disappeared.

The positive inducements for powerful new groups of merchant venturers like the Greeks, Palmyrenes, and Nabateans (and their allies and suppliers) are obvious. So also are the advantages that would be seen by Persian, Greek, and other administrators, conscious of the expanding imperial frontiers of their responsibilities. The Tigris was navigable for much larger vessels of deeper draft. Its development as the major artery assured the availability of international prestige goods to local elites, while at the same time enhancing state income through taxes on the transit traffic. But we must not overlook the

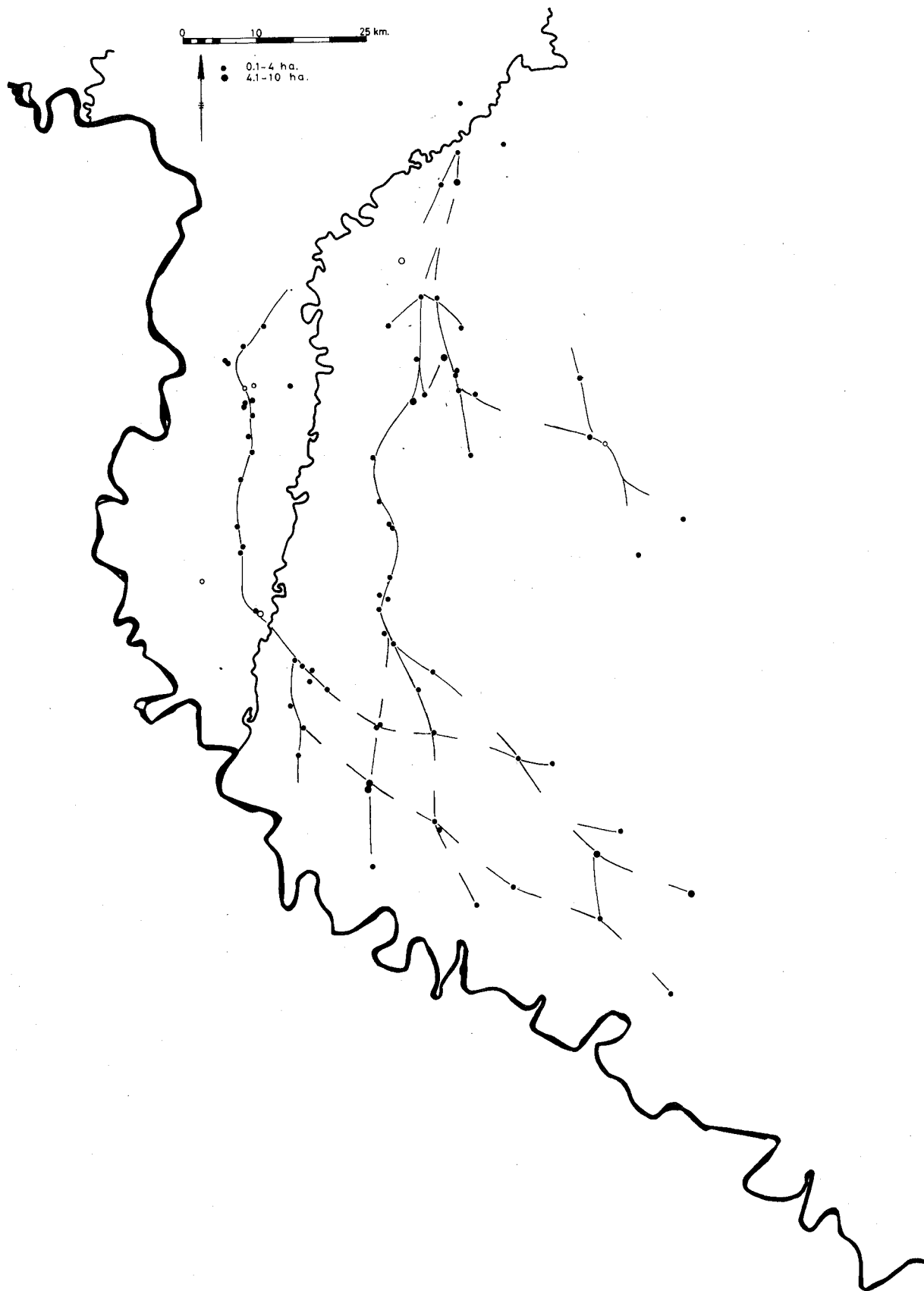


Fig. 41. Neo-Babylonian-Achaemenian watercourses and settlement patterns on the lower Diyala plain.

## Culmination and Collapse of an Agrarian Base and Urban Superstructure

accompanying negative consequences. The effect of the shift was slowly but permanently to reduce the status of the lower alluvial plain of the Euphrates from what had once been the most advanced locus of powerful states and cities to a subordinate appendage.

This was so in three respects. First, the introduction of transverse canals from west to east, cutting obliquely across the natural orientation of drainage (and the older irrigation system) from the northwest, greatly increased the agricultural and settlement potential of the upper plain. In time, therefore, a whole series of similar channels were developed. These were (from north to south) the 'Isa, the Sarsar, the Malik, the Kutha, and the Great Sarat-Nil of the classical Islamic period (Le Strange 1905, p. 24), which in modified form still exist today. The impetus behind new canal construction gradually shifted northward, in other words, with the advantage of opening new lands where slightly higher natural gradients made salinity a less chronic (or at any rate, less immediate) problem.

Second, the consequences of the new urbanization along the Tigris and the development of a new irrigation grid in the northern part of the Tigris-Euphrates alluvium were by no means limited to the lands between the two rivers. Some of the new cities like Ctesiphon lay on the opposite bank of the Tigris, and it was only natural that the lower alluvial fan of the Diyala River should receive the same stimulus. Previously the lower Diyala plain had been politically marginal and thinly settled, relative to the central Euphrates floodplain, but now a basis was laid for that area to become even more densely urbanized. The results of my archaeological survey of the Diyala region can be recalculated in terms of the same size categories used in this study, and a comparison illustrates strikingly the dramatic rise in its importance (see table 19).

The entry in table 19 for the period around 2000 B.C. is intended to provide a baseline from which to assess the subsequent changes. At that time, and in fact throughout the more remote antiquity of the region, the aggregate occupied area on the lower Diyala plains amounted to less than a quarter of that in the intensively surveyed part of the central Euphrates floodplain. Moreover, the percentage of urban sites was substantially smaller. Both proportions dropped lower still and remained at those low levels through the Achaemenian period. But by the Seleucid-Parthian period the percentage of urban settlement was already appreciably higher than it was to the south of the Tigris, and by the Sasanian period the total occupied area within the two regions was nearly equal.

The immense expansion of settlement that went on in the Diyala region should not be thought of as a smooth and uniform infilling of lightly occupied districts. Had that type of growth occurred, we would more likely find a proliferation of small settlements such as might

TABLE 19 A Euphrates-Diyala Comparison of Trends in Settlement

Period	Lower Diyala		Central Euphrates	
	Estimated Hectares of Settlement	Estimated % Urban (10+ Hectares)	Estimated Hectares of Settlement	Estimated % Urban (10+ Hectares)
Ur III- Isin-Larsa	602	35%	2,725	75%
Neo-Babylonian- Achaemenian	134	7	1,769	51
Seleucid- Parthian	1,857	69	3,201	55
Sasanian	3,489	75	3,792	58

*Note:* The two left-hand columns are derived from Adams 1965, tables 12, 16, 17, 18, and 19. The Neo-Babylonian and Achaemenian totals have been aggregated, and the first three listings have been recalculated by size category rather than estimated area, to provide equivalences for the figures used in this study. The right-hand two columns are taken from figure 25 and tables 15 and 17.

have been established by groups of agriculturalists migrating in search of less saline soils or less oppressive conditions of tenure. But instead the pattern to be seen in figure 42 is a markedly discontinuous one with, as just noted, a higher proportion of urban sites than in regions to the south that formerly were more thickly settled. Large areas whose agricultural potential is confirmed by their later utilization still were virtually unoccupied, while elsewhere the grid or lattice pattern of site and canal distribution suggests that other large areas were completely cultivated. The center of gravity of the pattern shifted considerably to the east and south, although a few isolated but quite large urban centers also appeared west of the modern course of the Diyala and in the northern part of the region.

Some development of the Tigris left bank below Ctesiphon is indicated, corresponding to what had already begun on the right bank below Seleucia a few centuries earlier. But the cluster of substantial towns and cities that were founded at this time 50 kilometers or so to the east of Ctesiphon is not so easily explained as a derivative of the founding of the new Parthian capital. Most of the larger sites define a southeasterly axis for a major part of the Diyala's flow, well to the north of Ctesiphon and in fact competing with it for Diyala water. Moreover, the aforementioned cluster traces a fanlike pattern of distribution, very similar to later patterns in the same area that were made possible only by a great weir across the Nahrawan canal north of Uskaf bani Junayd (Jacobsen 1958; Adams 1965, figs. 18-19). It is thus more than likely that this impressive barrage had a smaller Parthian precursor on a Diyala channel that had undergone some enlargement—and that may be

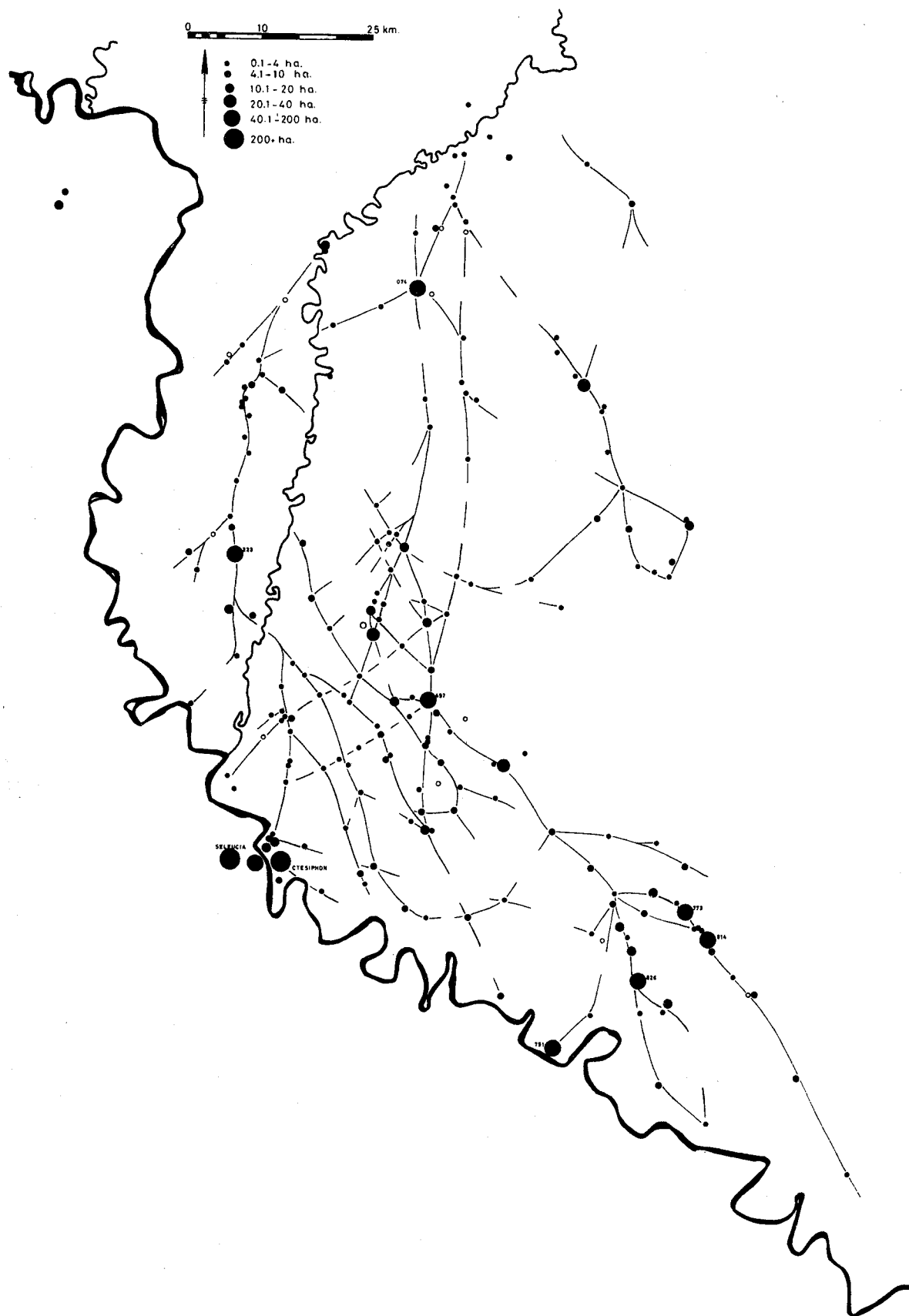


Fig. 42. Seleucid-Parthian watercourses and settlement patterns on the lower Diyala plain.

regarded in a sense as the Nahrawan's antecedent. Whatever the administrative and fiscal responsibility that the Parthian state authorities in Ctesiphon may have exercised over this enterprise, it is obviously not to be regarded as a product of a mere coming together of scattered groups of peasant immigrants seeking new lands.

No details on irrigation and settlement trends comparable to these for the Diyala alluvial fan can yet be provided for the northern part of the Tigris-Euphrates alluvium, but it would not be surprising if they were to indicate a generally similar trend of rapid growth. North of the latitude of Kish and Babylon there had also previously been comparatively sparse settlement and few centers of urban proportions. By Parthian times, on the other hand, Gibson is able to identify four major cities to the north and northeast of Kish alone and to speak of the "incredible density of population implied by miles of virtually continuous settlement" along the Kutha canal in the Sasanian period (Gibson 1972, pp. 51, 57). But what must have held back the northern end of the Tigris-Euphrates alluvium, at least to some extent, was the periodic destruction visited upon it by invading armies. Babylon had suffered extensive destruction under the later Achaemenids, and a substantial part of its population must have been drained off to Seleucia soon thereafter. Seleucia in its turn was destroyed by Roman attack in A.D. 165, founded anew in early Sasanian times, then sacked once more and permanently deserted in 283 (Streck 1917, p. 24). Somewhat better protected behind the Tigris River, cities and towns on the Diyala plains fared better.

In short, the shift to the Tigris and the introduction of a new irrigation grid triggered secondary changes in an adjacent area that were perhaps even more extensive than the primary ones. After the intense development of the lands along the lower Diyala the preeminence of southern Babylonia was irretrievably lost.

These first two factors involve the comparatively more rapid growth of settlement and agriculture in the north because of advantageous new programs that were undertaken there. Their negative influence on the south was only indirect, in that part of the population must have been drawn away to participate in them. But there is a third factor that involved directly deleterious changes. The new transverse canal pattern permanently disrupted its older counterpart. For millennia the latter had preserved the natural condition of an alluvial fan, in which a number of channels separated from one another near the head of the plain at Sippar and followed parallel or radiating courses down its length. Under that original pattern the sources of water for the south were less immediately subject to diversion and control by northern competitors for the same scarce resources. Now, however, there first were an increasing series of diversions to meet the demands of settlers on the upper plains, with

only the excess being passed along to the region of the ancient cities of southern Babylonia. Moreover, the requirements of the upper plains would have to be reckoned to include navigation as well as irrigation; it served needs of the state other than agriculture to maintain a relatively large diversion of Euphrates water into the Tigris near Seleucia through the tails of the Nahr al-Malik.<sup>5</sup> Thus the south gradually lost its access to a dependable water supply, while the volume of water carried by the Tigris correspondingly rose.

This does not imply that water failed to reach the south, for the great swamps that prevailed there in classical Islamic times conclusively show otherwise. But it would have tended to arrive more irregularly, with shortages manifest particularly during the early, low-water part of the growing season, in unmanageable flood crests, and via the tails of lower Tigris diversions at levels frequently too low to command the available land for large-scale and canal irrigation. Not immediately, but over the long run—it must be stressed that this was not a constant but an irregular process, and that it continued over centuries—the inhabitants of the lower plains found it more expedient to drift northward themselves than to resist the conditions that were closing in upon them. Herein lies the underlying cause for the inexorable northward movement of the perimeters of settlement whose beginnings were already evident by the late Parthian period, and which by Middle Islamic times had seen an almost complete abandonment of the entire southern portion of the Euphrates floodplain.

This discussion of the implications of the shift has been in a sense premature, in advance of an account of general conditions obtaining on the lower plain during the Seleucid-Parthian period. While the reorientation of the canal network at the head of the alluvium had begun by Seleucid times, the dire long-term consequences that have been sketched were by no means felt immediately. In the region around Uruk, on the contrary, the Parthian period has been interpreted as "the culminating epoch in the entire settlement record" (Adams and Nissen 1972, p. 58). This was because by Sasanian times the abandonment of the southern part of the region was well under way, but in any case the existence of an impressive final period of population growth and apparent prosperity there is undeniable.

We must bear in mind, in considering the overall pattern of Seleucid-Parthian settlement, that the sites from which it is reconstructed may have been occupied at any time during a period of perhaps five hundred years. More specifically, the Seleucid and Parthian components of it cannot yet be readily distinguished. Furthermore, there is no independent evidence as to the degree of continuity of occupation that obtained in the smaller towns and villages across the countryside. With these reservations, the general impression nevertheless is one of little

more than an intensification of a system that had already been laid down in outline in Neo-Babylonian and Achaemenian times.

Figure 40 shows clearly that extensive further canalization took place along the Tigris right bank below Seleucia. Much of this depended on progressive extensions of the *nar malkha* that had been brought from the Euphrates to that city. The lands along the Tigris meander belt levee thus served do not appear to have been settled or cultivated previously, and they must have been an attractive prospect for agriculturalists drawing in upon Seleucia (and in the Parthian period Ctesiphon) from many parts of southern Mesopotamia. Over time, the tails of the *nar malkha* system gradually must have been lengthened to take advantage of the fertile, well-drained (if also prone to flooding) levee terrain. Undoubtedly by the Parthian period, and perhaps even earlier, the Neo-Babylonian–Achaemenian canal system 40 kilometers below Seleucia was annexed to it directly. It is only the greater age of these sites farther downstream that indicates they were once part of an independent system antedating the arrival of Euphrates water. More recently, as figure 40 shows, the ubiquitous meander-cutting process along the Tigris has cut into the tails of the *nar malkha* system at intervals so that some of its branches can no longer be followed as a continuous levee.

We must assume that there have been course changes all along the middle Tigris, partly through localized meander-cutting like this and partly through more pronounced movements. In one such change the bed of the river moved eastward from a position between Seleucia and Ctesiphon to a present course probably adjoining Ctesiphon itself while passing through the ruins of the later Sasanian city of Weh Ardashir or New Seleucia (Invernizzi 1976, p. 172).<sup>6</sup> Similar shifts have occurred farther downstream, although in most instances the powerful aggradational effects of periodic flooding have made it difficult to follow them in detail.

The pattern of change of the Tigris course was undoubtedly complex and frequently reversible. The substantial Islamic town of Dayr al-‘Aqul, for example, was described in the tenth century as being situated on the south or right bank of the river, whereas today its ruins are on the left bank (Adams 1965, p. 91). Yet study of the air photographs indicates beyond question that the irrigation system supplying it during at least its earlier heyday was an effluent of the Nahrawan canal. During the Sasanian period and probably also the Parthian period it must have been situated on the left bank, therefore, and its reportedly different position in classical Islamic times was the result of no more than a temporary oscillation. The ruins of Humaniya are also found on the Tigris left bank today, slightly farther downstream, but in this case the left bank ancient canal patterns provide no hint that the town ever lay on the north side of the river before

its abandonment. Between the two towns, but 15 kilometers north of the Tigris course that they very roughly suggest, lay a city directly on the lower Nahrawan canal that in Islamic times was called Lower Uskaf (Adams 1965, pp. 66–67). Plausibly, but not with certainty, this can be identified as the earlier Hellenistic city of Scaphae, shown in the Ptolemaic map of Mesopotamia as lying directly on the Tigris. However, a reconstruction carrying the bed of the Tigris at any one time past all of these points would involve an enormous northward loop, entirely beyond the dimensions of the present Tigris meander belt. Hence one must suppose that there has been a greater latitude to the river’s past movements than is suggested by shifts that would place individual towns successively on its right and left banks. But unfortunately there are as yet no other historically attested points between Ctesiphon and Dayr al-‘Aqul with which to confirm and extend our knowledge of these wider shifts.

Still farther downstream along the Tigris right bank, about 100 kilometers below Seleucia, there are traces of an additional new canal of Seleucid–Parthian date. Its distance from the apparent tails of the *nar malkha* system of the time makes its direct dependence on a Tigris offtake likely. Having recognized the effects of Tigris course changes, however, we must acknowledge that the headworks of this canal may have lain considerably farther to the northwest than the bend in the river that at present appears to represent the start of the canal. Quite possibly the original offtake of this canal will one day be found in the archaeologically unsurveyed region farther northwest along what is now the left bank of the Tigris. There was, in other words, a rapid filling in of the entire new Tigris levee area once the shift of a few of the main urban centers to its banks had been undertaken.

On a more limited scale, something comparable seems to have occurred in the southwestern part of the central Euphrates floodplain. Figure 43, illustrating Seleucid–Parthian settlement patterns within the intensively surveyed area, depicts a network of new canals west-northwest of Uruk that must have been fed by Euphrates courses by now situated far to the west of the former Babylonian cities. Farther upstream, Gibson (1972, p. 50) has noted a contemporary westward shift toward a Euphrates course in the vicinity of Babylon. Presumably this was the course that also, at one or more offtakes far below Babylon, was the source of water for the new canals above Uruk.

Thus there seems to have been an unprecedented dispersal of Euphrates water. Some, by way of the *nar malkha* and the outskirts of Seleucia, was even being applied along the Tigris levee to the east. Another portion was following one or more channels comparable to the modern Hilla and Hindiya branches in the western part of the alluvium. Yet, in spite of these diversions,

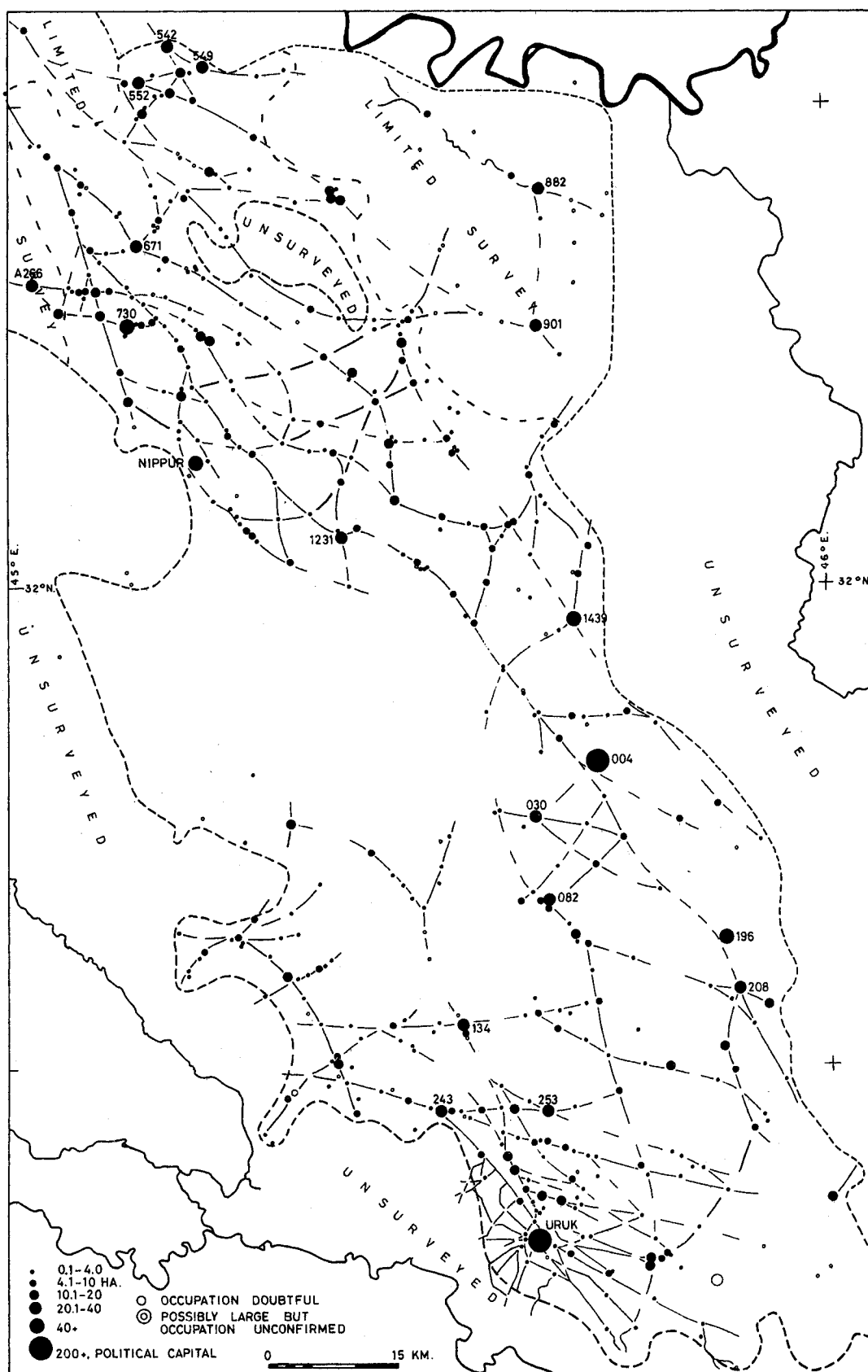


Fig. 43. Selucid-Parthian period settlement patterns in the intensively surveyed region.



figure 43 suggests that there was a further increase in the density of settlement even in the central floodplain, north and east of Nippur. There is every reason to believe that, with an increasing geographic breadth of dispersal as well as density of settlement, consumption needs on the lower plains were beginning to approach the limits of what the Euphrates could supply with reasonable security for those dependent upon irrigation agriculture.

As I noted previously, Seleucid-Parthian settlements tend to be irregular and discontinuous rather than compact. Only a few were of the proportions of major cities, a mere 25 percent of the total occupational area in sites larger than 40 hectares as contrasted with 38 percent at this time in the Diyala region and 55 percent in the same central Euphrates area during the Ur III period. The large centers are fairly evenly dispersed, suggesting that they were performing central place functions for hinterlands of fairly uniform size, but there are some discontinuities in the distribution of intermediate towns. In places, as above both Uruk and Nippur, there are close-spaced clusterings of the latter that in most cases seem to go back to Neo-Babylonian or Achaemenian antecedents. Elsewhere, as in the newly canalized area farther to the west-northwest of Uruk, there is a noticeably more regular dispersal of small and intermediate towns in long linear series of villages. This whole area gives the appearance of being a planned, large-scale development, not organized by and around a central city (or at least not one that has yet been located through archaeological reconnaissance). If the survey provides any evidence of Seleucid or Parthian state intervention in the development of the central alluvium, apart from the founding of the capital cities and the canalization of their immediate hinterlands, it is probably to be found here.

Substantial, vigorous occupations continued through the Seleucid period at both Uruk (Greek *Orchoi*) and Nippur, but at both sites this is followed by a textual and numismatic gap during early Parthian times until shortly before the time of Christ. Nor can this be filled by finds at sites elsewhere in the region, and it may well be that there was an interval of 130 years or so in which activity in at least the major centers was much diminished (Nissen 1973, p. 82; Adams and Nissen 1972, pp. 57–59).

The silence is hard to explain. No direct testimony has yet been found of destructive campaigns in the immediate area as a consequence of intradynastic rivalries. Perhaps one should simply assume that military activities initiated by Charax under Hyspaosines (ca. 140–121/120 B.C.) were focused on a handful of the major towns with important temple precincts, including Uruk and Nippur, to which it has already been noted that knowledge of cuneiform writing was largely confined. Only in these centers would the use of clay tablets have persisted to meet some functional needs for record keeping, while elsewhere records in Aramaic were written on materials

that have almost entirely perished (Oelsner 1978, p. 106). Speculating further along this line, one could argue that fairly limited and selective destruction thus would create for us today the impression of a major abandonment. On purely *a priori* grounds, the case for continuity instead of abandonment is that the prosperity, periodic autonomy and even expansion of Charax under weak Parthian suzerainty seems as likely to have had positive as negative consequences for southern Babylonia in general. But the absence of evidence for economic or building activity elsewhere in the region, even though based on a very inadequate body of observational data, remains unexplained with this hypothesis. At present it can only be said that, for a substantial period, the region simply drops from notice, perhaps with some accompanying movement of population (and especially the urban population) northward toward new centers of power like Seleucia and Ctesiphon.

The recovery, in the first and early second centuries A.D., is also puzzlingly silent in view of its impressive scale. Keall has argued, plausibly if not conclusively, that a "southern strategy" was pursued by Vologases I (ca. A.D. 38–60) and his successors. Presumably it was aimed at circumscribing the independence of the Greek traders in Seleucia, imposing a Parthian governor in place of the Hyspaosinid dynasty at Charax, and ultimately securing a greater return for Parthia from the Palmyrene trade with India (Keall 1975, p. 625). It would have coincided with the first arrival by sea of Chinese silk, a costly luxury for which there was soon an enormous demand in the Roman world (Nodelman 1960, p. 102), and this may even have precipitated the decision to reassert greater control over affairs in Mesene and Characene.

The founding of Vologasias to undermine the role of Seleucia could well have been a part of such a strategy. At one time the new town was thought to have been situated on the Euphrates, but a location on the Tigris below Ctesiphon and Seleucia now seems fairly certain (Maricq 1959). An impressive fortification at Nippur, repeatedly rebuilt on the ruins of the Temple of Enlil and occupied between roughly A.D. 70 and 160, is seen by Keall as another manifestation of the same objective. It was left unfinished, and he believes it may have been intended merely to house a garrison placed there to help assure rural security on the plain south of the capital, rather than to withstand a siege (Keall 1975, p. 626). Yet attention should be called to another impressive fortification, apparently contemporary and close to Nippur (site 826). Someone went to a great deal of effort to protect something, in a region and period of time for which the available sources give no hint of either military activity or internal dissidence.

It is a distinct possibility that these installations are connected in some as yet undefined way with the Palmyrene caravan traffic. That traffic, already substantial,

greatly intensified in the second century, even after Trajan's invasion and conquest of Mesopotamia (A.D. 114–17) was followed only by Hadrian's abandonment of Roman territorial aspirations there. The route between Charax and Palmyra was now marked with milestones, provided with a carefully organized system of wells and way stations, and protected by guard posts manned by contingents of Palmyrene mounted archers. These were recognized as auxiliary units of the Roman army, and Palmyrene commemorative inscriptions honor other Roman military agents who not only also operated deep in Parthian territory but accompanied caravans all the way to Charax itself (Nodelman 1960, pp. 111–12).

The aspirations of the "southern strategy" were at best briefly attained, in other words. By the beginning of the second century, Parthian control had weakened to the point where its toleration of Palmyrene-Roman operations in nominally Parthian territory constituted a passive acknowledgment of Roman supremacy. Even if a fort like Nippur may have been begun as an initiative of the Parthian crown, therefore, its final rebuilding after the time of Trajan may have been a response to different stimuli. Architectural evidence for Zoroastrian religious practices in the phase III fort at Nippur rules out a Palmyrene garrison, but not necessarily a local undertaking at Palmyrene behest. In the case of Uruk, too, Nissen suspects that its last period of growth and prosperity must be somehow linked with the caravan traffic (1973, pp. 83–84). But in both cases the nature of the links remains elusive.

To summarize briefly these inconclusive leads, the central and southern Euphrates floodplain lay on the very margins of the extensive but loosely integrated Parthian realm. It does not figure in any official accounts yet known, in spite of the dense population and extensive building that went on there during the first and second centuries A.D. There is every reason to believe that Parthian control, and perhaps even interest, fluctuated markedly. Observing that "the whole question of the relation between Parthia and the small surrounding kingdoms which are usually described as vassal-states remains to be clarified," Nodelman stresses that Arsacid claims to suzerainty "must have been at most intermittently enforced" (1960, p. 103). Keall, too, concedes that imperial control "was little more than a veneer" and that "not infrequently the term 'Parthian Empire' is a misnomer" (1975, p. 620). It does not seem credible, in these circumstances, to identify as the primary stimulus for developments in our region the policies envisioned (and seldom consistently followed) by the Arsacid dynasty in Ctesiphon. For perhaps the last time, under the special conditions of a power vacuum on the lower Mesopotamian plain generated by Roman-Parthian military and trade rivalry, the inhabitants were for a time left relatively undisturbed to pursue initiatives of their own. That

they did so with such marked success—at least as measured in the extent and density of settlement—merely confirms the stimulus that similar conditions offered to their remote ancestors four millennia earlier.

#### *The Sasanian Period (A.D. 226–637)*

The Sasanian period, as I have already pointed out in the preceding section devoted to an overview of demographic and urban trends, represented in many respects the apogee of ancient developments on the central Euphrates floodplain. As I also noted earlier, however, the characteristics for which the dynasty is principally known were not by any means uniformly present throughout the period. Vigorous strategies of unification were foreshadowed in a series of acts and aphorisms credited to the early rulers in the dynasty but then were substantially reversed during much of the fourth and fifth centuries by the growing independence of the landed nobility (Frye 1956, 1:319, 325). Only in the sixth century, in a series of moves characteristically combining military successes on the frontier with Byzantium and elsewhere with an administrative consolidation and fiscal reform, did the dynasty's centralized strength and capacity for large-scale, coordinated planning emerge once more in unmistakable form.

In an important sense, as Pigulevskaja has cogently argued, it is in the cities that one finds the most tangible embodiment of the cumulative transformation the Sasanians effected:

Comparative study of the ordinances of Hellenistic towns, those organized as a *polis* and others, and of conditions in towns during the crowning epoch of the Sasanid state, leads to the conclusion that they had lost their independence of administration. They had nevertheless conserved and developed their original organizations of crafts, of corporate groups having their own representatives. The "imperial cities" began to occupy a new and important position, constructed and protected by the shahs, who interested themselves in them for economic as well as political reasons. [1963, p. 231]

Again, however, the reservation can be voiced that a brief summary like this tends to compress an irregular series of developments with opposing tendencies, a kind of dialectical process, into a smoothly cumulative series of changes. It is not within the scope of this study to deal in detail with the oscillating balance of forces that instead seems to have occurred over time, but even the archaeological findings for the period cannot properly be understood without further reference to the dynamics behind that shifting balance. Altheim has briefly summarized the process as follows:

The Sasanian economic landscape divides itself into two parts: on one side the domain directly under royal

rule, and on the other the domain of the landowning nobility in which the central power operated only indirectly. It was in the interest of powerful, far-reaching royal control to increase the number of royal cities and their attached rural districts. This had the effect of converting indirectly ruled into directly ruled districts, and only partly taxed districts into fully covered ones. The history of the royal founding of cities thus also concerns the struggle between royal power and that of the nobility.

Royal foundations, whether new or simply renamed former settlements, were only possible on royal lands. It was Ardashir's intent in founding a new dynasty to do away with the restraints on earlier kings by keeping in his own hands all the lands that he had won with the spear. In this fashion he succeeded in expanding the territories under his direct rule, giving him the possibility of founding or refounding cities in his own name. [1962, p. 220]

After Ardashir (A.D. 226–41) and his successor Shapur I (241–72), these policies were for a long time largely dormant. Only under Qubadh (488–531), in connection with a complex internal struggle over the Mazdakite religious movement, were circumstances favorable once more for the royal power to assume the initiative. A broad reform of the fiscal base of the empire was begun with comprehensive measurement and recording of cultivable areas subject to tax, and this was carried to completion by Khusrau I Anosharwan (531–79), with whose reign the dynasty attained its greatest influence. Taxes on behalf of the central authority, previously levied only on urban landholdings that were subject to direct royal control, were extended under his rule to all other holdings as well. A new nobility of service, without an independent base and hence more responsive to royal direction, was established both to fill sharply escalating administrative needs and to undermine the position of the landed nobility. Also on royal initiative, the construction or renovation of irrigation works, roads, and bridges was undertaken on an apparently extensive scale. And always symptomatic of the accretion of royal power, we hear once more under Khusrau of the founding of cities (Altheim 1962, pp. 222–23; Altheim and Stiehl 1954, pp. 11, 133–34; Nöldeke 1973, pp. 164–65).

The tax reforms are of particular interest for the light they shed on the agricultural regime of the Sawad, roughly coterminous with the Tigris-Euphrates alluvium. Head taxes, levied three times a year on all males between twenty and fifty years of age, ranged between four and twelve dirhams according to means. Land-tax rates, applying only to fields under specified kinds of cultivation, were based on crop type and productivity. They were set at one dirham per jarib (0.1592 hectare) for wheat and barley, five-sixth of a dirham for rice, seven dirhams for lucerne or clover, and eight for grapevines. Six olive trees or ordinary palms were also taxed one

dirham, but in the case of the finer Persian palms that rate applied to only four. Provision had sometimes been made for the remission of taxes in the event of crop failure, but now the needs of the state for an assured level of revenue were firmly declared to take precedence over the fluctuating ability to pay of individual agriculturalists (Nöldeke 1973, pp. 241–46).

The effect of the new approach represented by these reforms was not merely to rationalize the preexisting system and make it more uniform but to introduce a structure of incentives that had previously been largely or wholly absent. By specifying fixed amounts of tax per unit area regardless of yield, an inducement was given to landowners and tenant agriculturalists to maximize their own rates of return by cultivating more intensively. Apart from other forms of state intervention devoted largely to the most capital-intensive portions of the irrigation system, this would presumably have fostered additional local investments of labor and capital. Land leveling and improved field canalization and drainage were surely among the most productive forms this could have taken, but quite possibly the rate schedule also favored an expansion of summer cultivation or a shift to crops with a greater unit value. One is reminded of the Sasanian political precept that “the tax (*kharaj*) is the support of the state; nothing increases it like justice and nothing reduces it like oppression.” Enunciated already at the beginning of the dynasty, it was not only verbally reaffirmed by Khusrau I Anosharwan but seemingly brought nearer to practical implementation as a policy (Morony, n.d., chap. 1, sect. 2). On the other hand, there is reference to such a reform only for the Sawad, and it may not have been extended to the realm as a whole.

Gross taxes received from the Sawad under Qubadh were reported in later Arab sources to have been the equivalent of about 214,000,000 dirhams. No directly comparable later figure has come down to us, but after wide fluctuations state income from all sources is said to have risen steeply under Khusrau II Parviz (590–628). If geographic regions can be assumed to have maintained their relative proportions until the time of Mu'awiya (661–80), the income from the Sawad in Parviz's eighteenth regnal year would have been on the order of 240,000,000 dirhams. Dividing gross revenues on the same assumption, it might even have increased to more than 340,000,000 dirhams by the end of his reign (Altheim and Stiehl 1954, p. 41). There is, of course, a very real possibility that these numbers were corrupted during the long and uncertain process of transmission to the Arab chroniclers on whom we depend.

Unfortunately, moreover, there appears to be no completely credible approach to disaggregating the totals in order to arrive directly at the scale of the agricultural system and the relative magnitudes of its various components. If due allowance is made for exempted uncul-

tivable and fallow lands, it is difficult to imagine the tax base (at any rate within the alluvium) in any given year exceeding 25,000 square kilometers. This is less than 16,000,000 jarib. If only the minimal rates for wheat, barley, and rice were paid for at least three-quarters of it, which surely was the case, then a very heavy tax burden obviously must have fallen on orchard crops—and particularly dates. Relying again on Neo-Babylonian density figures (above, p. 186), and assuming equal numbers of Persian and ordinary palms, taxes on date orchards could have supplied a potential state income of 45 dirhams per hectare for no more—and probably considerably less—than 4,000,000 jarib. This suggests that the revenues credited to Qubadh are within, but approaching the upper limits of, the bounds of credibility if we assume that the land tax was the major component in those revenues.<sup>7</sup> The figures for Khusrau Parviz, or certainly the one reported for the end of his reign, are then progressively less realistic. The most that can be said is that they lend some support to an observation already made on the basis of survey data, that there had apparently been an immense extension in both population and cultivated area as compared with the most prosperous periods of earlier antiquity such as the Third Dynasty of Ur.

Official sources thus offer us a vague, remote, and generally unsatisfactory picture of the agricultural regime, even though an aphorism attributed to Khusrau I Anosharwan explicitly recognized the state's dependence on productive agriculture as the principal source of its own prosperity (Adams 1965, p. 71). The scale and sophistication of planning that was involved in the irrigation system assures us that there were competently staffed engineering offices. Something is known of such offices for the Islamic period, at which time there were cadres of specialists in different phases of construction and elaborately codified techniques for leveling, water lifting, and water allocation (Wiedemann 1906; Cahen 1947–48; Bosworth 1969, pp. 151–58; Jabbar 1973, pp. 24–28). The model on which they were organized was certainly of Sasanian derivation, at least in its main features. Other specialists in considerable numbers would have been needed for cadastral surveys, and it is inconceivable that their work could have been conducted without extensive written records that have entirely disappeared. By contrast, the fiscal authorities may not have been especially numerous, although it was only their activities that seem to have received the notice of the heads of state. Quite possibly individual records were not necessary, with taxes being as a rule levied on a whole village, town, or district, collected by the community itself, and then turned over as a unit to crown agents three times a year (Newman 1932, pp. 163–64; Løkkegaard 1950, pp. 139–40; but cf. now Goodblatt 1979, pp. 259, 270). There were also crown lands, of course, that must have been man-

aged more directly. But other than with regard to rural security and irrigation, the crown's knowledge of and interest in the countryside extended little further than the extraction of revenue.

We are fortunate in having one body of roughly contemporary textual material with a quite different perspective—the Babylonian Talmud. It has serious limitations of its own as a source on agricultural practices and conditions, but, on the other hand, it furnishes us with a diverse, richly textured account filled with anecdotal detail at the level of direct, personal interaction. There may even be an advantage of reduced bias and selectivity in that the Talmud reflects no conscious concern with depicting the life of its times but instead is preoccupied with perpetuating and inculcating various rabbinical traditions. Newman's contribution (1932) in painstakingly winnowing and systematizing the mass of material is one for which nonspecialists must be grateful.

To be sure, the full representativeness of the Talmud must be doubted on a variety of grounds. The presence of unbelievers is referred to at intervals, but its only direct concern was with a large, vigorous Jewish community that in the main was responsible for its own affairs. At least to judge from the available data, Jews lived in a relatively small number of compact settlements, many of them rather large, in which they constituted a heavy majority. They enclosed themselves, and were enclosed by, a complex set of mechanisms for maintaining social boundaries. Even apart from some practices whose distinctiveness rested directly on formal religious grounds, therefore, it is obvious that there may have been some significant differences with regard to basic economic institutions and matters of subsistence between them and other religious communities.

In addition, there are spatial and temporal discontinuities. The main concentration of Jewish settlements seems to have lain well to the north and west of the ancient lower and central Euphrates floodplain region primarily dealt with in this study. Neresh is apparently the only named village or town that was regarded as a part of the Babylonian Jewish community, whose location on the Nahr al-Nars is likely to have placed it as far south as the latitude of Nippur and on the central Babylonian plain. Most of the major towns instead lay on the Euphrates north of Babylon, on the transverse canals connecting the Euphrates with the Tigris, or along the Tigris above and below Ctesiphon (Obermeyer 1929, p. 242 and passim; cf. the convenient summary in Neusner 1966, p. 248). Furthermore, the Talmud must be understood as a later compilation and redaction of material covering a fairly long span of time. The greater part of Newman's evidence on agriculture seems to derive originally from the encounters and disputations of the third and fourth century rabbis, while the period of greatest interest here is the apogee of Sasanian settlement in the

sixth century. Although the differences may not have been large, it is troubling not to be able to control for the unconscious, later smoothing away of archaisms.

Herein lies the most pervasive limitation of the Talmud as a source, for it goes to the heart of the picture it can provide even of the major Jewish settlements in their own place and time. Neusner has succinctly, if perhaps too pessimistically, summarized the difficulty:

What is most significant is the unreliability of Talmudic materials for the history of the Jewish community. It indicates that the final collectors and editors were not concerned about historical reminiscences, which must have survived, but only about other matters mainly pertaining to events and opinions within the academies. [1969, p. 47]

We cannot too often remind ourselves that all we know about Babylonian Jewry consists of what the rabbis chose to transmit in their schools. Nowhere does that fact become more striking than in the study of the life and culture of ordinary Jews. We have limited archaeological data, the magical incantation bowls and the paintings in the synagogue at Dura-Europos. Rabbinic literature provides little persuasive evidence about what the latter may have meant, or what the former were used for. Our consideration of the external structure of the Jewish government of Babylonia quickly came down to study of germane rabbinic sayings and stories. It was the limited usefulness of these data that become in the end the most obvious and convincing result of our inquiry. [1969, p. 125]

*over Newman*  
If I find Newman's contribution more useful than this seems to suggest is possible for the Talmud as a source, it is of course because Neusner's objectives are not the same as those of the study. The purpose here is not a detailed reconstruction of institutions and a flow of historic events, but merely a sketch of enduring features of routine agricultural life that can complement the fiscal and martial preoccupations of the crown and the mute ruins of towns and canal levees. Page references are included in the following account only where an observation by Newman is directly quoted:

Wheat was apparently the staple crop, at least in the circles in which the rabbis generally moved. It was clearly more valuable than barley, although in the homes of the wealthy it might even be fed to dogs. Following wheat in order of importance were barley, spelt, rye, oats, rice, and millet. Bread was made not merely of flour from grain, but also from rice, millet, and even lentils. Pulses were also of considerable importance. Seeming to follow in order behind them was the cultivation of vines (black and white grapes were distinguished), dates (Persian and inferior Aramean), sesame, flax, vegetables, and cuscuta (for brewing beer). Hemp was cultivated in some districts, both for cheaper varieties of cloth including shrouds for

the dead and for rope. Spices were much used, including most commonly pepper, ginger, and mustard, and perhaps were also cultivated locally.

Some features of this pattern seem more likely to have been restricted to the Jewish community (or even to an upper stratum within it) than others. The disproportion of wheat over barley is an example, although this must be partly a result of geographic factors. Wheat and barley both were kept as major crops through the entire historic record in middle and northern Babylonia, in contrast to the south, where barley almost completely replaced wheat by the second millennium B.C. because of its greater tolerance for salinity. To judge from early 'Abbasid tax receipts, on the other hand, even in the administrative districts falling within what had been middle and northern Babylonia barley accounted for about five-eighths of the combined production of these two cereals (Jacobsen 1958, pp. 12, 46, 52-53).

Newman's suggestion that grapes preponderated over dates is a similar case. He notes that date beer was more common in the south and wine in the north, and it seems completely beyond question that the date palm has at all times been enormously more significant than the vine in the agricultural economy. Again there may be a religious, class, or even ethnic explanation, the grapevine having been better adapted to the Palestinian hills from which the Jews had been forced into exile. He does note, incidentally, that "in the list of permanent investments in which a man is advised to invest his wife's money, date palms precede vines, the order being: land, houses, date-palms, other fruit trees, and lastly, vines" (1932, p. 99). Moreover, date palms are observed to grow untended in the countryside, without the care of a gardener.

Apart from the production of foodstuffs for sale, linen was the most important article of commerce. There were special urban markets for flax, and some town neighborhoods were known for their specialization in flax-soaking. "Of such importance was linen to Babylonian trade that . . . public prayers, during which the Shofar was sounded, were offered when this commodity fell in price to three-fifths of its value" (Newman 1932, p. 23). Various forms of oil for lighting as well as cooking also must have been circulated commercially. Sesame-seed oil was the staple, much more common than olive oil, although the latter apparently was not prohibitively priced. Also mentioned for these purposes are cottonseed oil, pitch, melted animal fat, and fish oil.

Domestic animals have as yet received no mention. There were religious or customary prohibitions on the ownership of herds, apparently related to conflicts over pasturage rights, but numerous references indicated that Jews at least participated in herd ownership and were extensively involved in growing animal fodder. Moreover, Jews could and did serve not only as shepherds for others but as specialists in the breeding and fattening of animals.

Chickens, ducks, and geese were also raised, and there are even many instances of fish-breeding in special ponds.

Cultivation practices that are mentioned include fallowing, crop rotation, intercropping of grain and vines (one wonders how this was classified for tax purposes!), and cross-plowing with oxen. Canals are ubiquitous. The common use of lifting machinery in connection with some of these canals is suggested by religious conventions specifying which kinds of flowing water were suitable for washing. Manuring of fields was widespread, usually by arrangement between a landowner and a herd owner covering the maintenance of a flock in a particular field. Perhaps because of the extensiveness of this practice, fields were frequently fenced with stones, wood, or staves intertwined with twigs. Handmills, donkey-drawn mills, and watermills, in increasing order of size, are all referred to. All in all, the impression is one of a thriving, fairly intensive, surely diversified agricultural system. There had been a number of important introductions since the Achaemenian period (probably including rice, although it was present earlier in Khuzestan) and a market rather than a subsistence orientation may well have become dominant. Yet there was a darker side that should not be lost sight of: "Ten measures of poverty came down to the world, nine of them were taken by Babylonia, and the one was distributed among the other nations of the world," is an anonymous saying of the Rabbis, and this was further emphasized, in the Gemara, in the ensuing discussion, by the statement 'Babylonia is the place for poverty' " (Newman 1932, p. 24).

There is a third textual approach to the condition and administration of the Sasanian agricultural economy, alongside the fiscal preoccupation of the major annals and the elements of the subsistence background that occur in passing in the Talmud. It consists of references to antecedent conditions that occur in Arab sources after the conquest, or of institutional and other patterns that the Arabs may be inferred to have taken over with little change from the Sasanians. There is little doubt that this is potentially by far the richest source of all, but it is also the most beset with problems. Moreover, the scattering and immense diversity of the material calls for the lifetime work of specialists, not the summarization of secondary sources to which a study like this is largely limited. The sounder course here is to avoid doubtful matters of judgment as to putative Sasanian antecedents of Islamic practices and to deal with the latter only as they apply to the specific periods of time in which they are attested.

Compounding the difficulty is the fact that there are essentially no surviving Arabic sources that deal at first hand with the Mesopotamian alluvium during most of the first century after the conquest. The systematic recording of traditions began later, under the influence of partisan political and religious currents that make even references to the seventh century often tendentious and

anachronistic. In particular there were strong inducements to Persians to trace the main features of the new Islamic civilization growing up around them to pre-Islamic origins. To disentangle the thin thread of reality from a tangled skein of conflicting assertions in these circumstances is perhaps as challenging a task as there is in Orientalist scholarship. Fortunately, Michael Morony (1972, 1976) has made a most useful beginning on it.

With regard to institutional continuity between Sasanian and Early Islamic times, Morony has shown that there was considerable differentiation both by region and by social status. Persian settlement had been heaviest east of the Tigris and in certain garrison cities, but there was also a lesser aristocracy of *dahāqin* (sing. *dihqan*) who either lived on their rural estates or lived in the towns as absentee landlords. Accounts of the loss of life accompanying the conquest are surely much inflated, and significant numbers of the aristocracy not only survived but came to terms with the conquerors and initially retained their privileges. Over the longer run of sixty or seventy years, however, Morony concludes that many military and urban defectors and their descendants were integrated into the essentially different, Arab society of a new set of garrison cities like Basra and Kufa. The *dahāqin*, similarly, were first compromised and then increasingly displaced by a new class of Muslim landlords (1976, pp. 46–47, 51–52, 56).

At first glance this suggests the fairly intact transmission not merely of Persian outlooks and life-styles but of large components of the administrative system. Apart from the general disappearance of the highest levels of the old social order and administration (with some significant exceptions even there), Morony is at pains to stress the length of time that distinctively Persian elements remained in place and the multiple channels of transmission that were available. But it must also be said that ultimately a new and quite different integration was achieved—and that this was accomplished before any significant number of strictly contemporary accounts come to our assistance:

It should be noted that the disbanding of the *asawira* (Persian military contingents) coincided with the ruining of the *dahāqin*, the conversion of the Magians at Hira to Islam, the change of the language of the tax bureau from Persian to Arabic, and the coinage reform. These almost simultaneous changes underscore the impression that most of the direct survivals from the Sasanian period lasted for about sixty years after the conquest, until *ca.* 700, before they either disappeared or were integrated into a new Islamic civilization. [Morony 1976, p. 57]

Not to anticipate a fuller description of Islamic conditions yet to come, these observations have a direct bearing on the interpretation of Sasanian administrative practices insofar as they affected the settlement and irrigation system. Continuity in nomenclature is widespread. It has



long been known that most of the named Islamic towns, canals, and administrative divisions were Arabic derivations of Persian, Aramaic, or even older terms. But how safe is it to assume an essential continuity in the underlying demographic, economic, and territorial realities to which those terms refer? There were symbolic as well as material advantages for Persian partisans after the conquest to claim that this was so—that aside from a new religion, a new Arab elite (into which they would hope ultimately to be assimilated), and some new cities the former patterns merely reasserted themselves after an interval of disruption. There are also advantages for the scholar, who only on this assumption can hope to establish pre-Islamic geographic entities (leaving aside the larger towns and cities) with any confidence. But is it true? And if reason can be found to burden with numerous qualifications the assumption that it is, what does this imply about the smoothness and degree of continuity that was maintained through the Sasanian-Islamic transition in other respects?

Here we must take cognizance of one of the central findings of the archaeological reconnaissance. At least to judge from the intensively surveyed region, there was a major reduction in the settled area at—very roughly—the end of the Sasanian period. Much of the lower central floodplain of the Euphrates disappears from the archaeologist's view at that time and seemingly remained outside the scope of sedentary life for perhaps as long as a millennium. This was, of course, the region known to 'Abbasid geographers as the Great Swamp, but its description in these terms probably should not be taken to imply that more than a limited portion of it was continuously under water. Moreover, its designation as a swamp does not describe the etiology of those conditions. Can its formation be understood solely as a consequence of floods and perhaps other natural disasters, or only as the outcome of declining cultivation and maintenance capabilities that left the land more or less continuously open to such disasters?

Unfortunately, the timing and duration of the process of abandonment that in any case ensued must remain elusive inasmuch as archaeological surface collections provide the major evidence. Therefore we must leave open the question whether we are witnessing the fairly abrupt collapse of settled life. If this were so, it would not entirely decide the further question of the respective importance of the natural and social contributions to it. But it would lend weight to an event or series of events somehow connected with the conquest and its immediate antecedents. The alternative is that there was instead a broad regional—if not more general—economic decline or population shift, or both, whose effects gradually intensified during the first century or so of the Islamic period. What seems incontrovertible is only that there was a substantial and to some degree permanent withdrawal

coinciding with Early Islamic, and perhaps terminal Sasanian, times.

A number of contributory factors can be suggested, most of them not mutually exclusive. Direct physical destruction and population loss consequent upon the conquest itself may well have been the least significant. On the other hand, it is much more likely that the canal system was profoundly disrupted owing to prolonged lack of coordination and maintenance of what had become a highly complex and interdependent as well as large-scale network. It should not escape our notice that the areas most affected were the remote tails of the system, where the consequence of an attenuation of supplies farther upstream would have been felt most directly. We must also take account of the cumulative effects of ecological deterioration and Sasanian maladministration in the later sixth and early seventh centuries, including—but by no means limited to—the disastrous flood of 628. Perhaps, in fact, it was the conjunction of these factors, beginning with prolonged disarray in late Sasanian times and culminating in the piecemeal but ultimately complete overturn of the established order, that led to a disruption much more profound than would have resulted from any single element. What is significant here, however, is not so much a fuller specification of the causes of the breakdown and abandonment; that must be left as a problem for further research. At this stage we can recognize only the massive scale of the demographic decline that ensued and its historically unprecedented abruptness at least relative to that scale. It should therefore come as no surprise if, as a result, the break with older patterns of administration and nomenclature was correspondingly large and abrupt when reconstruction finally began in earnest.

More detailed justification can be found for this admittedly tentative proposal. On grounds of size alone, Zibliyat (site 700) and Jidr (site 004) were two of the important cities of southern Iraq during the Sasanian period. Their ancient names must be among those to which some reference continued to be made in Islamic times. Yet an identification eludes us.<sup>8</sup> Dwarfing them, and virtually all else, in importance in the eyes of Muslim analysts was the little buffer state of al-Hira. Its importance in Arab eyes is understandable, both because of the pivotal role it played in earlier politics in the Arabian desert and because it lay directly athwart their line of advance on the Sasanian empire. But it was credited with only six thousand head-tax payers on the eve of the conquest (Hitti 1966, p. 391). Its yearly average production of 30,000 *kurr* of grain (about 87,000 tons or 1,080,000 hectoliters) would, at Achaemenian yields (above, p. 000), which are the latest available, require a mere 540 square kilometers of cultivation (Kister 1968, pp. 151–52). For a principality of these modest proportions to loom so large in the consciousness of later Muslim historians, the latter would have had to be quite out of touch with conditions

in the Sasanian empire at the time of its maximum strength.

Let us further consider the gigantic canal system that served both Zibliyat and Jidr as well as Nippur. This was presumably the Nahr al-Nars, for at least in the thirteenth century Yaqut placed Nippur along its banks. Yaqut attributes its construction to the Sasanian king Narses (293–302), and he and all the classical Islamic geographers spoke of its source as having been an offtake from the Lower Sura canal somewhat downstream of the town of Hilla (Le Strange 1895, pp. 256, 260). But a mere glance at the succession of canal and settlement patterns on the Mesopotamian plain in Sasanian and Early Islamic times (figs. 44 and 47) shows that the upper part of this course is a later renovation, almost at right angles to the main axis of the system. What had clearly happened was that the Sarat-Nil canal, dug only in the time of the great 'Umayyad governor Hajjaj ibn Yusuf at the beginning of the eighth century (Le Strange 1895, p. 261), interdicted the former canal's line of flow so that a new source had to be found. This means in turn that no memory apparently had survived even among scholars and traditionalists of the different upper course antedating the time of Hajjaj.

No less in need of clarification is the pair of canals known as the Upper and Lower Zab, after which no less than three administrative subdistricts (*tasasij*, sing. *tassuj*) were named. In the Islamic period they fronted along the right bank of the Tigris, from above al-Na'amaniya to one day's march above Wasit (Le Strange 1905, pp. 38, 73). Easily 50 kilometers, this distance suggests either that the names have proved elastic again or, more probably, that the canals were originally components of a fairly extensive system. Yet all our sources are vague or in conflict over where they lay. It is impossible to avoid the suspicion that little more than the name and the region to which it very roughly applied may have come through the Arab conquest and the upheavals of population that followed it.

Similar doubts arise when we turn to the locations of other administrative districts. As I noted previously, most of the names betray a Persian origin. But some of them also betray a distressing tendency to wander. There is the case of the two *tasasij* that were both called Falluja and administratively placed within the same *kura*, of Upper Biqubadh, one containing the ancient town of Falluja at the very upper limit of the Euphrates alluvium and the other entirely detached from it, surrounded by *tasasij* of a different *kura*, and a 100 kilometers downstream (Morony 1972, chap. 1). Or, again, the *tassuj* of Barusma was unambiguously attached to Middle Biqubadh and placed well to the north of the Sarat-Nil canal by Ibn Serapion at the beginning of the tenth century (Le Strange 1895, pp. 255–56). Yet elsewhere (Fiey 1968, pp. 170, 253), with equal specificity, we are told that the same, presumably rather modest subdistrict also bordered on the subdistrict

of Nippur that lay 100 kilometers southeast. A possible explanation for both these anomalies lies in district divisions originally having been assigned by the Sasanians on the basis of territories served by particular canals. Barusma (in Sasanian times Beth Rushme), for example, would then have applied to a long, narrow but integrated domain before the advent of the Sarat-Nil system. But the point is that the Muslim historians and geographers were clearly unaware of the contrastive usages of an earlier time that might have helped to explain their own confusion.

These discrepancies have many common elements, but a common explanation cannot necessarily be found for all of them. Still less is it possible to reach any generalization that applies more widely, as to the extent of undistorted administrative knowledge that occurred across the lengthy and confusing Sasanian-Islamic transition period. But the difficulties do seem to justify treating the canal and settlement patterns of the Sasanian period essentially in terms of the physical remains they have left, rather than on the basis of what some Muslim authorities later said about them.

Five maps are relevant as we turn to a consideration of the settlement and irrigation patterns of the region between the Tigris and the Euphrates. Figures 44 and 45 deal with the immediately applicable findings of archaeological reconnaissance, the first for the greater part of the Mesopotamian alluvium and the second for the intensively surveyed region. Figure 36, already discussed in connection with the initial presentation of data on demography and the urban hierarchy, is a simulation of areas under cultivation in the Sasanian period from the data in figure 45 and table 21. Finally, as was the case only to a lesser extent in the discussion of the Seleucid-Parthian period, the LANDSAT imagery (fig. 6), and to an even greater degree the complete recording of surface traces of ancient canal patterns that is to be found on the base map, is of considerable importance.

The incompleteness of the settlement layout recorded in figures 44 and 45 must be stressed at the outset. Some of the factors involved have been previously presented, but others have not. Moreover, an understanding of their interrelations and combined significance is more essential for this period than for any other.

In the northernmost part of the plain the exceptionally numerous and massive sites of the later periods were for the most part not recorded (Adams 1972). By hindsight that is regrettable, but the reconnaissance there was conducted in 1956–57, at a time when a focus exclusively on Sumero-Akkadian and Babylonian history still seemed defensible. In any case, the application of a survey approach to the unfamiliar ceramics and very extensive remains of the later periods initially presented many difficulties. Fortunately, a more intensive resurvey was carried out a decade later (Gibson 1972), covering some 1,500 square kilometers in the district around Kish that is



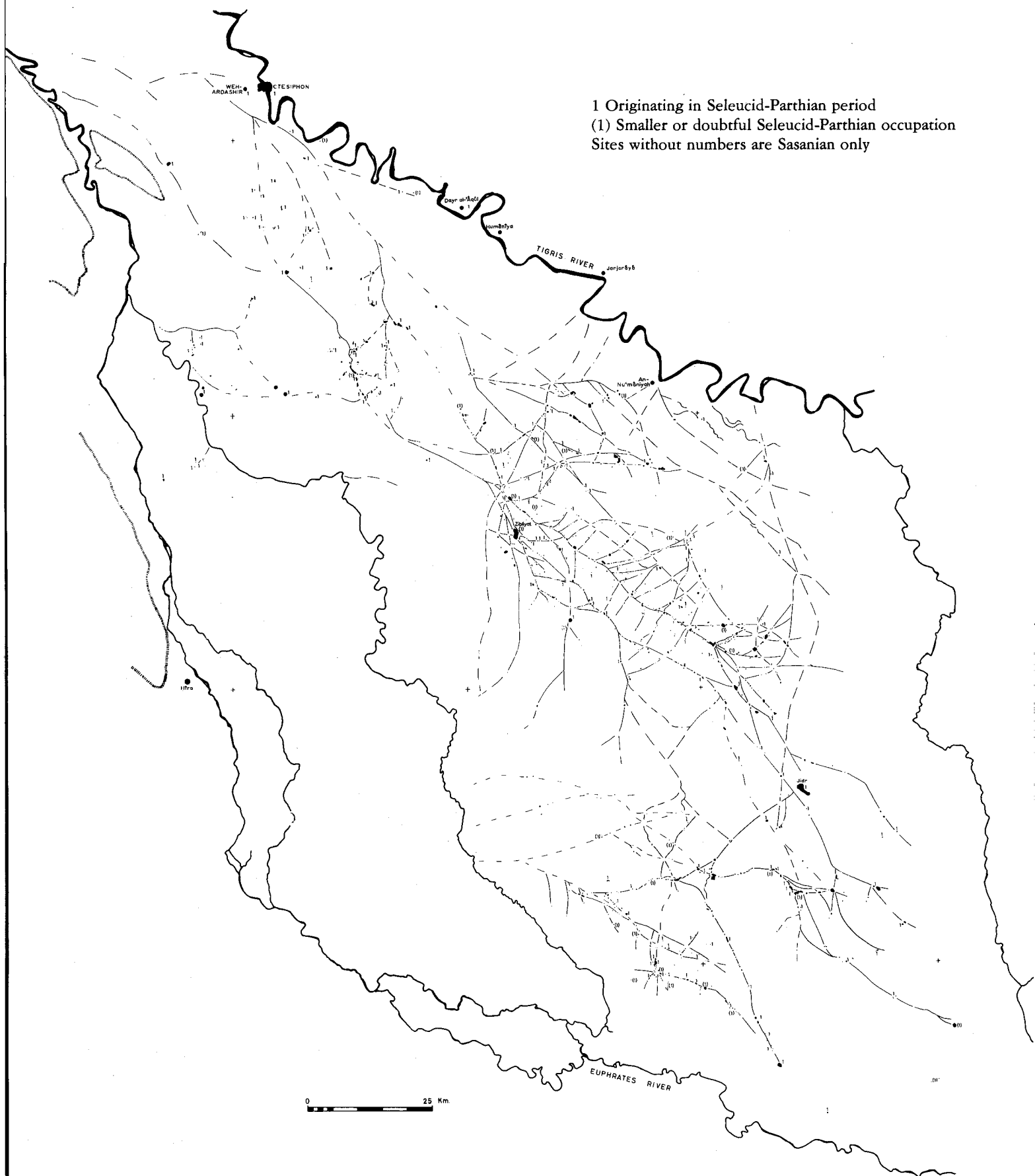


Fig. 44. Sasanian sites and watercourses on the Mesopotamian plain.

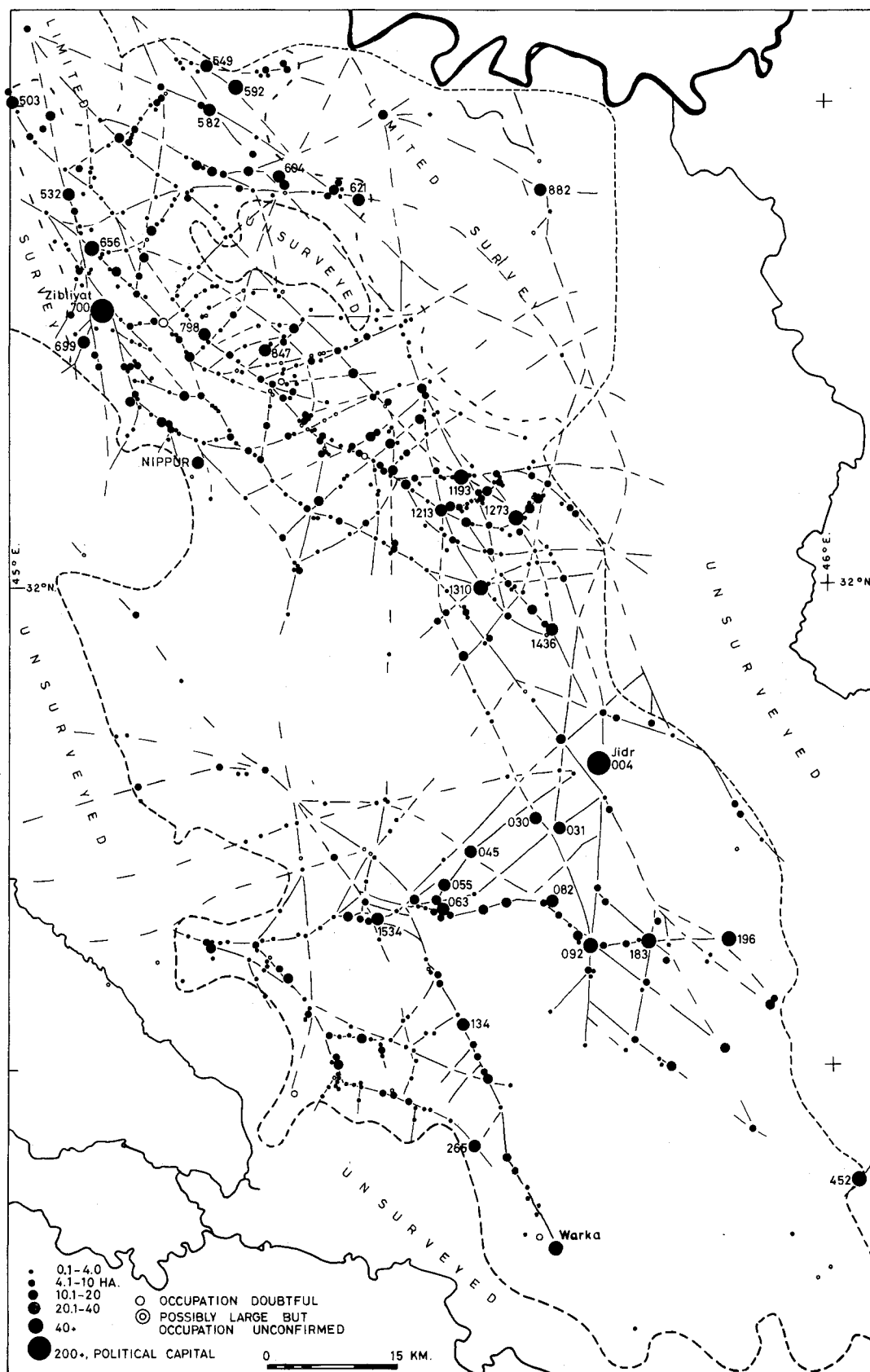


Fig. 45. Sasanian period settlement patterns in the intensively surveyed region.

fairly central to the northern part of the plain. But, admittedly, a reduced rate of site recovery is unavoidable throughout the upper part of the plain because of relatively widespread and intensive agriculture, large-scale land leveling and drainage projects, road construction, and many other forms of disturbance associated with the modern development of the Iraqi economy.

Around Kish, as in the region that is the principal focus of this study, Sasanian sites seem to have been the most numerous. The demographic significance of this is even greater, in that in at least some parts of that district separate sites cannot readily be distinguished since settlement was almost continuous (Gibson 1972, pp. 49, 57). The same generalization can be shown to apply to the Diyala plains on the opposite bank of the Tigris. If we exclude Baghdad and Samarra, on the grounds that these were imperial capitals drawing resources from an immensely larger region, by all odds the time of most extensive occupation there, too, was the Sasanian period (above, table 19; cf. Adams 1965, tables 19, 20). There are no reasonable grounds to doubt, in other words, that settlement and population throughout southern Mesopotamia was at its highest during that period. It is only an accident of the locus of modern development in the country, and of the focus and timing of archaeological surveys, that so little can be said of the northern part of the alluvium. The canals shown in figure 44, presumably the antecedents of the Nahr al-Malik and the Nahr Kutha of the Islamic period, accordingly are located largely on the basis of major surviving spoil banks and levee systems, and they cannot yet be shown to be of Sasanian date on any other grounds.

We face somewhat similar difficulties in generalizing beyond the effective limits of archaeological reconnaissance in the southern part of the alluvium. It was originally argued in connection with the computer simulation of figure 36 that very large, continuous tracts must have been under cultivation in order to support the population densities found within the intensively surveyed area. The simulation program's output in fact coincided fairly closely with the limits of the intensive survey itself (except in areas that seem to have been at most briefly used because of the growth of swamps). Since the limits of the survey were for the most part the quite arbitrary (and already superseded) ones of the 1962 frontiers of cultivation shown in the air photographs, one may reasonably suppose that further extensions of intensive reconnaissance would simply enlarge the pattern. Can this supposition be tested further?

Here the base map becomes the most relevant source, considered in combination with the Sasanian site layout recorded in figure 45. It will be seen at once that most of that map is covered with an unmistakable grid of ancient canals. Detectable also on the ground, those on the base map have in the main been traced from air photo-

graphs. Segments of the grid are in use again today, the old levees offering obvious advantages for siting new canals to maximize command of the land for irrigation purposes. But the grid to be seen on the base map is not in any sense connected with the rapid expansion of cultivation that has come in the last century or so.

This conclusion rests in part on the highly selective and discontinuous use made of the grid by modern canals. It is also shown by the irrelevance of the modern cultivation frontier to the layout at every point. Still more strikingly, it is shown by the fact that numerous branches of the grid are interdicted by, and hence are obviously antecedent to, the Shatt al-Hilla branch of the Euphrates itself, both above and below the towns of Suq Lemlum (site 1474) and Rumaytha (on the southwest margin of the base map). Lemlum was already occupied in essentially its present location at the time when the earliest European travelers followed the line of the Euphrates (Longrigg 1925, p. 2; Niebuhr 1968, 2: 251). Rumaytha may have been only a nineteenth century town (cf. Cadoux 1906, p. 186), but in any case it existed on the Hilla branch at a time long before the presence of more than an extremely thin and marginal fringe of agriculture there. Clearly, therefore, the virtually continuous grid of canals that constitutes the bulk of the evidence recorded on the base map is antecedent to the virtual abandonment of the region that had occurred by the Middle Islamic period and that continued in much of it until the threshold of modern times.

Furthermore, the preponderance of Sasanian remains in all surveyed regions very strongly implies that this was the time to which most parts of the grid must be traced. Some may be of Seleucid-Parthian origin, especially those along the southern margins of the area that afterward were increasingly abandoned to swamp. But the virtually doubling of the aggregate area of recorded settlement between Parthian and Sasanian times (cf. table 19) makes the later period much more likely for most of it. Similarly, the even steeper decline in aggregate settlement after the Sasanian period (cf. table 18), coupled with the northward retreat of the settlement frontier and the absence of substantial additions to the pattern anywhere (cf. figs. 45 and 47), makes an Early Islamic date of construction for any significant part of this grid extremely unlikely. The conclusion is inescapable that most of the virtually continuous ancient canal system to be seen in detail on the base map dates to the Sasanian period.

Some further amplification of the Sasanian canal layout in the still unsurveyed area adjoining the lower Euphrates can perhaps be gained by considering the LANDSAT imagery (fig. 6). The detection of some of the ancient watercourses suggested in this map may be questionable, since the minimal units of definition are many times larger than in an aerial photograph (above, p. 33). But it is significant that certain canals shown in figure 6 correspond

rather closely with ones shown on the base map and in figures 44 and 45. In particular, a comparison of these maps suggests that a major lower section of what is now the Shatt al-Hilla was once a canal, and that its course seems to form a further element in a grid with Sasanian canals to the north. Also shown in figure 6 are a series of apparent canals that once crossed or intersected with this course. At least to judge from the LANDSAT imagery, some of the water supplied to this area was routed to it from a western branch of the Euphrates—apparently the only branch at the time—in a position approximating that of the modern Hindiya branch. With a whole series of massive diversions farther upstream, it is not unlikely that in Sasanian times the Euphrates entered the swamps not far from the location of the modern town of Shinafiya on the Hindiya branch with very little if any residual flow.

I should stress once more that we cannot view this overall pattern as the product of slow, cumulative trends throughout the Sasanian period. What is known of the dynastic history of Sasanian times suggests instead that major agricultural expansion came primarily in the reigns of a handful of monarchs who somehow combined external military victories with temporary dominance over the landed nobility, and that the high point in the process was probably achieved early in the sixth century. If this is so, then not only the canals but the settlements that originally must have accompanied them would have been in use for only a relatively short time. For the settlements, this implies in most cases a relatively slight buildup of occupational debris. Since much of the area where this grid occurs is once more in cultivation, and since rapid alluviation is therefore also continuing over much of it, the prospects of ever adequately recording the communities that were newly founded to care for this immense extension in the cultivated land surface are, frankly, dismal. But any comprehensive assessment of the scale of the Sasanian achievement in Mesopotamia must nevertheless take their existence fully into account.

The area in which the new Sasanian canal grid can be most clearly identified is a broad band running from northwest to southeast. To the north, this band is perhaps best defined by what is now called the Shatt al-Nil, a major trunk canal (shown by a heavy line on the base map) that continued into the Islamic period and that in places still forms a broad, discernible depression. Large Sasanian towns line the banks of the canal, but the most important cities—at any rate Zibliyat and Nippur; Jidr is badly obscured by sand—are situated at short distances off to the south. This may mean that the original trunk canal, the one reputedly built by Narses at the end of the third century, paralleled the later one but lay farther south.

In any case, one can see that the countryside for a long distance to the south is divided into north-south strips by a fairly regular network of parallel, unusually

straight and hence carefully laid out branch canals. At intervals these are intersected by other canals, either at right angles or along diagonals, whose uniformity of orientation again indicates that they were laid out according to a large-scale, carefully surveyed plan.<sup>9</sup> The effect was to open up a very large new area for cultivation by dividing it into polygons of varying size, principally rectangles, trapezoids, and triangles of from as little as 20 or 30 to 1,000 or more hectares. Forming the boundaries were branch canals of varying capacity and, more important, of varying sources. In fact, the provision of multiple sources of water for essentially every enclosed field suggests a conscious element of "overdesign" in the entire system. It seems very likely that an important criterion in the planning process was the ability to substitute one water source for another. This would have encouraged the balancing of supplies and requirements across a vast area whose individual, cell-like compartments had no way to communicate quickly with one another.

The same considerations that define this canal network as primarily if not exclusively Sasanian also apply to the comparable network that parallels the right bank of the Tigris. In the latter case there is independent support for this dating since the central town of al-Nu'maniyah (now al-Na'amaniya) and its surrounding administrative districts were reportedly founded by the Lakhmid an-Nu'man ibn Mundhir (580–602) of al-Hira (Morony 1972, chap. 1, sect. 1). But this implies additionally that a number of major canals, shown on the base map and in the LANDSAT imagery (fig. 6) to have derived their water from the Tigris, are also very likely to be of Sasanian origin.

Here then we must recognize a system whose enormous growth had led to a transformation of its requirements and mode of operations as well. It was shown much earlier that the Euphrates alone was adequate for only some 8,000–12,000 square kilometers of cultivation annually, principally because fall irrigation needs had to be met at a time when the river's volume was still low. Now it emerges that lands under at least periodic cultivation in the Sasanian period were vastly more extensive than this, extending over the greater part of a floodplain five or six times larger than even the higher of these two figures. Even with the omission of somewhat less than half of this owing to the practice of fallowing, well over twice as large an area must have been simultaneously under irrigation as the Euphrates alone could supply. Consistent with that observation are the data on density of settlement (where they exist), on the planning for utilization of alternate water sources, on the actual construction of offtakes that could have been fed only from the Tigris, and on the amount of cultivation that would be needed to supply the state's reported revenues if the land tax were their principal source. The Sasanians succeeded in introducing such extensive cultivation, in other words, that it presupposed an irrigation system comprehensively planned to

use Tigris as well as Euphrates water to meet minimal irrigation requirements.

This should not be taken to imply that Tigris water was in widespread, continuous use throughout the central floodplain, or that Euphrates and Tigris supplies were normally deployed there in unison and without geographic restriction. The critical period was during the fall and early winter months, and this was also the time when the Tigris was relatively more manageable. Hence its most extensive use is likely to have occurred at that time. As the spring flood approached, it was probably drawn upon only for cultivation along its own levee backslope, which could not be provided for as readily in any other way. Similarly, it would have been difficult and wasteful to bring Tigris water westward to areas close to the Euphrates. This suggests that there may have been a practical basis for the customary distinction made by Muslim geographers like Ibn Serapion (Le Strange 1895) between lands irrigated by the Euphrates alone and other lands irrigated by the Euphrates and Tigris together. Especially included among the latter was what had been the Sasanian crown domain of Kaskar, across the river from whose major center the Islamic city of Wasit was later founded. In the late Sasanian period the *kura* of Kaskar extended westward to include Nippur as one of its subdistricts (Morony 1972, chap. 1, sect. 1), so that most or all the great plexus of Sasanian canals serving Zibiyat and Jidr as well as Nippur lay in the area formally defined as having been served by both rivers.

In many respects it is the comprehensively planned and executed, large-scale approach to the use of the Tigris that epitomizes the Sasanians. While there is no evidence that it lay within their powers to place a weir directly across so broad, swift, and dangerously variable a body of water, they were clearly prepared to make the massive investments and to assume the risks that went with constructing large diversions from it. The existence of a policy of this kind is most conclusively shown by the largest Mesopotamian canal of all times, the Katul al-Kisrawi-Nahrawan system that served the entire lower Diyala region on the Tigris left bank. Its long intake had to be deeply incised through the headlands of Samarra, and it followed a course that necessitated crossings of both the Adheim and the Diyala rivers before it reached the major cultivable areas it was intended to serve. Apart from the technical competence and uniformity of design displayed in many details of its construction, what is most striking is the ambitiousness with which the Sasanian engineers planned it to transform the basic drainage patterns of a vast alluvial landscape (cf. Adams 1965, pp. 76–79).

Yet while a grand design is clearly apparent behind the Katul-Nahrawan's general layout, we must also recognize that it relied to a considerable extent on preexisting irrigation works. Figure 46, newly derived from an analysis of the air photographs, primarily shows the system of other

canals that existed before the introduction of the Katul-Nahrawan in the time of Khusrau I Anosharwan (A.D. 531–79). The positions of the Katul and the Nahrawan are also shown with a dotted line, however, and it is evident that much of the latter merely pieced together or linked up—while of course also greatly enlarging—earlier components. After its construction the entire system was more or less rapidly rebuilt so it could be supplied from the Nahrawan as the major source of water, but how much of this had been accomplished before the end of the Sasanian period is not clear. Its fully reconstituted form, with the Nahrawan as the unquestionably central axis, is to be seen only in the map referring to the Early Islamic period (fig. 51).

No systematic body of Sasanian surface collections or recorded site observations is available comparable to that for the pre- and protohistoric sites discussed in chapter 3. But the ruins of the period are remarkable for more than their vast extent. Much of the Sasanian pottery is drab and seemingly mass produced, and the proportion of glazed wares is small and also unexciting (see appendix to this chapter). Well-fired bricks, on the other hand, are frequently found in profusion. Bits of copper or bronze as well as iron are fairly common even on the surface. Extensive if generally shallow looting of Sasanian cemetery areas on older sites seems to indicate that valuable seals, signets, and perhaps coins regularly occur in graves. Large, carefully made basalt milling stones abound, presumably having been brought down the Euphrates from Syria. Above all, there is a marked increase in the quantities of glass to be observed on the surface as compared with Parthian and all earlier sites.

In this connection, let me call attention to the series of sites specializing in glass manufacture along a newly dug Sasanian canal northwest and north of Uruk-Warka (particularly sites 1532, 1533, 1534, and 092). The scale of what can only be described as industrial production there is suggested by mounds hundreds of meters long that apparently are composed mainly of glass slag. Numerous glass furnaces also can still be seen in place.

To understand the resource base that led to such specialization, it is worth noting that in late Sasanian times the area south of this canal line probably had begun to include extensive swamps. Here would have been found large accumulations of snails as a source of calcium carbonate, for they still occur in seasonal and permanent swamps in this area today in almost unbelievable numbers. Suitable water-laid sand might also have been supplied locally. Finally, naturally occurring plants in the same area are reported to be a source of sodium carbonate.<sup>10</sup> There is little to suggest that these sites were extensively involved in fashioning glass vessels from the raw material they produced in such quantities. But the important point is that, in difficult terrain at a great distance from the main centers of administration and consumption,

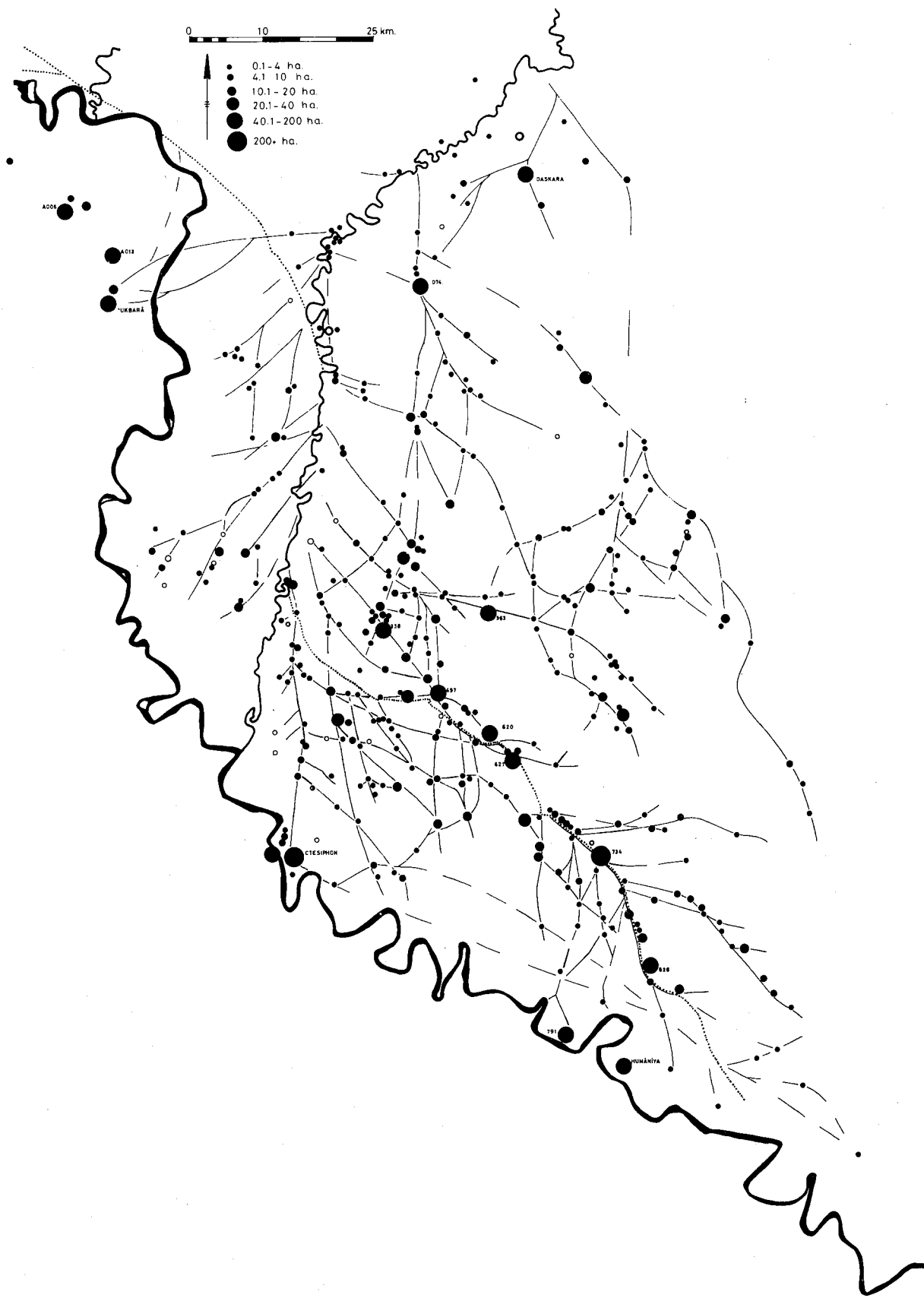


Fig. 46. Sasanian watercourses and settlement patterns on the lower Diyala plain.

## Culmination and Collapse of an Agrarian Base and Urban Superstructure

a large-scale industrial operation went on (probably into the Early Islamic period) that implies a fairly high degree of economic integration not merely in the cities, but extending throughout the countryside.

Virtually all the features of the Sasanian system that has been brought forward in the foregoing discussion have two aspects. On the one hand, they reflect the development of increasingly complex integrative mechanisms, and on the other hand, they show a new dependence on those mechanisms that was not smoothly reversible. The articulation of regionally specialized glass production facilities with distant urban markets is one example, but the irrigation layout is perhaps the most compelling one. Not merely its initial design but its continuing repair and operation depended on knowledge and resources that simply could not be supplied by autarkic local villagers in the event of a breakdown.

The scale of the canal network, in the first place, meant that breakdowns might occur far from the districts where their effects were most serious. Second, the "overdesign" feature mentioned earlier frequently would have given those nearest a silted-up or breached supply canal a number of alternatives by which to compensate for their loss, but an accumulation of a number of such problems or deficiencies upstream would have left those nearer the tails of a canal network with critical shortages for which there was no simple remedy. Third, there is every reason to believe that there were weirs, sluice gates, and perhaps other components of the system that were particularly vulnerable to damage (natural or man-induced). Their continued, effective functioning presupposed a centrally supplied staff of specialists, and perhaps the capital resources of the imperial treasury as well. Nothing is known directly of irrigation facilities in this immediate region, to be sure, but the sophisticated Sasanian engineering works on the Nahrawan canal in the lower Diyala region (Jacobsen 1958, pp. 87-91; Adams 1965, figs. 18-21) are virtually certain to have had close parallels here. In particular, there is a major fan of radiating branch canals at site 1213 that surely indicates a weir of imposing dimensions and other control works as well. For all these reasons, accompanying the whole program of agrarian expansion was an increased dependence on central coordination and control.

Yet we have also seen that political stability remained as remote a goal as it had ever been. Faced with internal revolts and powerful external enemies, the crown could make no realistic provision for the long-term continuity of agricultural management. Its tax "reforms" rigidified as well as increased the burdens on the agricultural population, imposing fixed demands that in variable natural circumstances could not always be met without extreme hardship. Its preoccupations, in fact, were with maximizing fiscal returns, on which its own immediate strength depended, and with the possibility of windfall spoils from

military forays into Byzantine and other foreign territory. Its urban and agrarian policies were pursued less for their long-term effectiveness than for their immediate effect on the shifting balance of power between the crown and the landed nobility.

For all the grandeur of the Sasanian economic achievement, here lay its crucial weakness. Each new expansionary step reduced rural self-sufficiency and tended to place the whole mechanism more and more at the mercy of destabilizing political forces. In the absence of any means of controlling those forces, the possibility of sudden, deep, and tragic oscillations in the supply of the basic necessities of life for great masses of the population loomed ever larger.

There were other built-in flaws as well. The development of a latticework of long, intersecting branch canals, each gradually building up a levee of its own, made each enclosed polygonal cell an internal drainage basin. Acting together with an improvement in the supply of irrigation water, this greatly increased the dangers of salinity. The requirement of drainage if this problem was to be alleviated may have begun to be recognized, for the name of one canal implies that it was at least partly designed to carry off excess water (Morony 1972, chap. 2, sect. 1). On balance, however, the problem could only grow worse. The extensive band of new canalization south of Zibliyat and Nippur that I have already referred to, for example, had the effect of obliterating an important avenue of natural drainage. Additionally, as both the population and the state's own fiscal demands increased, more land had to be brought into cultivation regardless of the declining returns that might be expected from it. In time, therefore, we must assume that average productivity began to decline. Output in those areas that were most adversely affected would have declined precipitously, and the population dependent on them now would have had fewer and fewer alternative areas to which they could turn. There is no way to determine how much average living standards would have declined, but for some of those caught at the margins the decline must have been catastrophic.

A further, potentially serious loss of flexibility involved the role of livestock as a subsistence alternative. Large herds have always represented a form of investment. A relatively secure reserve in time of crisis, they provided a means by which a displaced group could bridge a difficult transitional period and take up life in a new area. Herds can be partly maintained on stubble, on volunteer growth in fallow fields, and on limited, strictly controlled grazing of young shoots of barley. These sources are not likely to be adequate for the whole year, however, at least if the number of animals is consistently kept near its upper limit. Uncultivated or waste tracts (within or beyond the limits of cultivation) thus play a crucial part in the keeping of herds, particularly seasonally filled depressions

whose shrinking margins can yield excellent forage in the late spring and summer. This niche declined steeply in size as a consequence of the immense expansion of the Sasanian cultivated area, however, so that an absolute decline in herd carrying capacity seems almost certain. With the human population having grown rapidly in response to the extension of the irrigation system, therefore, the ratio of this animal reserve to potential human needs must have fallen sharply. Dependence on cultivated fodder was a partial substitute, whose importance we have seen attested in the Talmud, but at some point this brought herds and people into more direct competition for the same set of increasingly scarce resources. Again, the effect would not have been uniformly felt and may not even have entered into urban (i.e., recorded) perceptions or conscious state planning. But it must have had an adverse effect on more marginal groups, especially during times of crisis that may have been precipitated by quite different causes.

Thus we can identify several features of a classic syndrome: increasing population density, reduction of flexible reserves with which to meet periodic crises, reduced productivity at least in the more marginal districts, and increased reliance on the state administrative structure even though the latter remained as vulnerable to disruption as ever. To these we can add a final factor, perhaps largely consequent upon the others. Epidemic disease can be expected to accompany all the circumstances just described, and indeed there is documentary evidence for it. Early outbreaks of plague are chronicled in the Talmud, occurring in the third and fourth centuries (Newman 1932, p. 24). Probably much more serious and general were those that began in the sixth century and continued into the eighth. As yet there is no basis for even guessing at their impact within Mesopotamia, but it has been estimated that the loss of life elsewhere in the Middle East associated with the "plague of Justinian" (541-44) alone was 20-25 percent (Dols 1977, p. 17). And while this obviously would have acted to reduce the negative effects directly associated with overpopulation, the social disruption accompanying serious outbreaks of disease might also have hastened the breakup of the administrative superstructure on which the whole irrigation system depended.

In summary, then, there is another side to the Sasanian achievement. As we have seen to be the case also in the smaller realms of earlier antiquity, many of the most impressive gains were fundamentally compromised by the absence of anything other than qualified, short-term political stability. In addition, whether consciously or not, short-term advances in scale, complexity, revenues, and all the other convenient indexes turned out to have been purchased at the expense of increasing ecological fragility. In this sense the essential dynamic of the Sasanian demise was an internal one. Its replacement by a new Islamic

civilization changed the course of world history, but the primary explanations for its collapse are to be found in its own decay rather than in external pressure (cf. Adams 1978, pp. 332-33).

There is a fundamental fragility and transience to the Sasanian accomplishments, in other words, a set of deep internal contradictions that the dynasty's predilection for monumental building only intensified. Something of this was perhaps even apparent to observers at the time. Writing only a generation after the advent of Islam, Isaac of Ninevah surely had in mind the utter dissolution of their imposing facade of power in a passage that still reverberates today:

They have entered it as an inn for a night and left it as travellers on a journey over the whole earth, without thinking of return. Some of them kings, some governors, some wise, some honoured. Some of them scribes, some orators, some judges, some commanders of armies. Some of them possessors of riches, some lords of goods. And now after their death there is neither the order of their degrees, nor the crowns of their government; nor their dreadful thrones, nor their lordly pleasures, nor the praise of those who honoured them. [Quoted in Morony 1976, p. 56]

## *The Islamic Period (Post-A.D. 637)*

For two quite different and yet connected reasons, only a more limited discussion of the Early Islamic and 'Abbasid periods is appropriate than that for the preceding periods. On the one hand, there has been a rebirth of specialized interest in the economic and social history of medieval Islam that promises important new advances in our understanding within a short space of years. It would contribute only confusion to indulge in a further rehash of secondary sources, many of them no longer responsive to the issues at the center of current debates. On the other hand, the archaeological contribution that can and must be made to those debates requires little space for adequate presentation. It is essentially a negative finding, documenting a precipitate retreat from a vast central area of the Sawad that continued for centuries and has reversed itself only in modern times, and also calling attention to the lack of references to the local details of this process in the works of the major chroniclers. Either of these considerations alone would argue strongly for brevity; together, they compel it.

The steps in the headlong Muslim conquest of Iran, and then the advance westward across North Africa and into Spain, took place on a greater, more familiar stage than the one with which this study is concerned. They need no recounting here. Nor does the strife and succession under the early caliphate that first saw the rise of the



'Umayyad dynasty in Damascus (A.D. 661–750) and then the assumption of power by the 'Abbasids leading to the establishment of Baghdad and its growth into a metropolis of unprecedented size. But meanwhile the only significant break in what almost seems a veil of silence with regard to the south-central Sawad during that long series of epochal events is in connection with Hajjaj ibn Yusuf's resolute, repressive governorship of the province of Iraq in the late seventh and early eighth centuries. He was demonstrably active on the immediate peripheries of the region and probably within it as well; his founding of Wasit and construction of the Nil canal connecting the Euphrates with al-Nu'maniyah have already been noted (cf. Hitti 1966, pp. 449–50; Périer 1904).

If the golden age of the caliphate was the time of Harun al Rashid (786–809), then the climb to the summit of world power had been steep. The descent was even more abrupt. It signifies that the consolidation and expansion of Islam was a phenomenon on a different scale from those considered here, the outcome not of a patient amassing of men and resources within a delimited area, but of a spreading conflagration that for a long time seemed to know no limits. Nothing that went on concerning the agricultural heartland of the caliphate sheds much light on that momentous process of growth. But there is not much doubt that the mismanagement and consequent deterioration of the heartland was one of the decisive, converging forces contributing to the dissolution that quickly followed.

The effect on imperial revenues has long preoccupied scholars, as indeed it preoccupied learned observers at the time. A recent article by David Waines (1977) not only summarizes present understandings of the fiscal as well as administrative collapse that had overtaken the 'Abbasid realm by the later ninth century, but also traces some of the deeper rural roots of the process. His account makes reference to archaeological findings in the Diyala region east of Baghdad (Adams 1965, chap. 8), but in this context his appraisal of the documentary sources is more immediately relevant.

Conceding a thicket of problems that includes copyists' errors and the difficulties of distinguishing normative from descriptive lists of receipts, Waines shows that there was a decline by about half in gross imperial revenues between the time of Harun and the second decade of the tenth century. The Sawad, which had supplied about a fifth of the total, or 100 million dirhams at the outset, was supplying little more than 10 percent, or 20 million dirhams, at the end of it. Erosive processes were not limited to the more distant extensions of the empire, in other words, but were in fact concentrated around its heart. Moreover, they increased in intensity, with most of the loss occurring between the time of Ibn Khurdadbeh's records (845–73) and those of Ali ibn 'Isa (915). In many strategic and formerly prosperous *tasasij*, losses of 90 percent or

more were recorded in this period of less than a single human life span.

The causes underlying the decline of agricultural production in the Sāwad are to be found within a broad set of relationships between the 'Abbāsīd ruling apparatus and the rural population. This sector, primarily the labour force of the agricultural system bore in large measure the indirect effects of 'Abbāsīd imperial attitudes and the more direct effects of their administrative policies and political fortunes. When the rural population finally turned against this constellation of pressures, it had only recently fallen victim of a wave of disorder resulting from conflict within the ruling order itself. The destruction to rural life wrought by this conflict was then compounded by the conflict of large segments of the rural population against the ruling order. The damage to the irrigation based agricultural system caused by several decades of unrest was predictable and is starkly reflected in the figures of 'Alī b. 'Isā's tax roll.

One factor implicit in the emergence of the crisis may be expressed abstractly in terms of the 'Abbāsīd view of the imperial edifice which differed in a significant respect from that of the Sāsānian. The 'Abbāsīds were the inheritors rather than the creators of the vast irrigation system which supported human life and cultivation in Iraq. For the Sāsānians, the core of empire had been a network of artificial canals connecting town and country; for the 'Abbāsīds, the empire was a network of highroads linking the metropolis with urban markets throughout their domains. Thus, orders of priority were different. To the 'Abbāsīds the irrigation system was a constant and, although they attempted certain renovations and expansion projects, what proved more decisive to the long run stability of the system was their tendency to disregard its depreciation. It is possible, too, that the 'Abbāsīds viewed agriculture in the Sāwad with a benign indifference so long as revenues flowed into the treasure from other sources sufficient to satisfy their own appetite for extravagance and to support a burgeoning bureaucracy and a demanding military. [Waines 1977, pp. 295–96]

No brief, general assessment of this kind can do justice to the parade of abuses to which the agricultural producers were increasingly subjected. Leaving aside those that were more violent and without shadow of legalism, the tax system alone defies the imagination. The basic rate of the land tax had been increased to a 50 percent share of the harvest under the Caliph Mahdī (775–85), but there were many supplemental payments ranging from salaries for the collecting personnel and surveyors to storage fees, enforced gratuities, and even charges for the paper used for records. Manipulation of the (Persian) solar and (Muslim) lunar calendars frequently led to demands for payment in advance of the harvest, and on occasion taxes were even demanded for the following year before the current year's harvest had been gathered. The spreading institution of tax farming escalated the rates

imposed and multiplied other demands upon the producer, enforced by torture, while the revenues turned over to the state by the officials receded. Herein lies an important caveat in using state revenues as the only available index to the state of the agricultural economy. In the long run the growing difference between collections and amounts forwarded to the treasury might be a serious source of economic damage, but in the short run it mistakes growing administrative ineffectiveness for general economic decline (El-Sammarraie 1972, *passim*, chaps. 4–5, p. 189).

In the sequel, the depredations of state officials, not to speak of even more direct plundering by Turkish mercenary forces, provoked a mounting tide of rural violence in response. The Zanj rebellion was put down with great difficulty only in 883, after fifteen years during much of which large areas around Basra and Ahwaz had slipped entirely outside government control. The Qaramita movement that followed it as the spearhead of resistance proved still more widespread and intractable, so that by the early tenth century urban administrators could only view much of the countryside as a sea of unrest and hostility that could never be completely subjugated. Violence fed on violence, in other words. The perimeters of state control drew irregularly inward, and prospects for any constructive, long-term approach to the agrarian economy diminished to the vanishing point.

A useful indicator of the increasingly circumscribed area within which agricultural operations received any form of state support is provided by the lists of weirs assembled by al-Khatib al-Baghdadi and Suhrab early in the tenth century. Thirty are referred to, some of them already at that time on canals that were not longer supplied with water. But even if we assume that all had continued in use until late in the ninth century, their locations are striking. Almost all are concentrated in the environs of Baghdad: south of Samarra, along the 'Isa and Nahrawan canals, and along other, even closer waterways. Only three lie at a greater distance, two along the Euphrates and its effluents in the direction of Babil and Kufa, and one between Babil and al-Nil (El-Sammarraie 1972, pp. 31–32; cf. below, p. 236).

It is ironic—but not surprising—that this devastating process of retrenchment should have given rise to a school of thought and popular movement glorifying indigenous “Nabatean” achievements, especially those connected with the spread of civilization and the improvement of agriculture. Even as actual conditions were deteriorating intolerably, exhaustively detailed compendiums were appearing with elaborate botanical nomenclature and careful specifications of all the procedures and requirements of good husbandry (Cahen 1971; El-Sammarraie 1972; Fahd 1977). Much of the practical experience and learning thus brought together and codified as part of the Shu'ubiyya movement, with implications of strictly contemporary dis-

sent, may well go back to Hellenistic times or even earlier. But its relevance to the needs and opportunities actually facing the agricultural population was minimal.

With an archaeological partiality for *la longue durée*, I have crossed over too quickly from the inception of the Islamic period to the time when conditions had been generated that were ineluctably leading to the collapse of the rural Mesopotamian sedentary life. This may be useful as a means of anticipating directional trends that are largely hidden in earlier, more fragmentary data, but a fuller look at demographic and fiscal data for the intervening period also is necessary.

The Muslims did not wait long to reinstitute the fiscal system the Sasanians had developed. Within ten years after the conquest of southern Mesopotamia, 'Umar (634–44) had appointed a commission to conduct a cadastral survey of the Sawad and to raise the land-tax rates as a source of provisions for the army. The competence of the surveyors (or perhaps of their informants) is in some doubt, since they concluded that there were some 36,000,000 jarib in the Sawad of Kufa alone (Hitti 1966, p. 426). Following Morony in using the smaller jarib of about 1,050 square meters, this amounts to some 37,800 square kilometers, which is about 9,600 square kilometers more than the maximum area (as indicated by planimetric measurement) that in Early Islamic times might have been defined as the Sawad of Kufa on the basis of having been irrigated from the Euphrates. The reported calculation is made even more unrealistic by its failure to take into account what must have been very large untaxable territories including the extensive areas that had been permanently submerged after the disastrous floods in 628.

Note also that the instructions to the commission sharply distinguished lands watered by the Euphrates from those watered by the Tigris. Perhaps this indicates that the Muslims were still ignorant of the combination of water resources that had become a fundamental requirement of the irrigation system. But it is rather more likely, after ten years of their control of the government, to reflect the breakdown of some of the more complex features of the system. Quite possibly separate zones dependent on each river had in fact reappeared, with a corresponding sharp decline in the gross area that could be cultivated.

Irrespective of the defects in their calculations and the shrinkage of the land-tax base, the commissioners are reported to have collected the surprisingly large amount of 100,000,000 dirhams in taxes from the Sawad of Kufa alone. Included in this amount were said to be head taxes on some 500,000 men, probably about a third of the total non-Muslim population (Hitti 1966, p. 428). Particularly if it reflects only the territory of Kufa as that was later construed, the population figure is extremely high; by way of comparison, it is between two and three times the estimate given earlier (above, p. 149) for the

population of the entire alluvium during the Third Dynasty of Ur. Perhaps it is only a symbolically rounded expression of a high estimate that was not based on actual enumeration, although such an interpretation would disquietingly undermine confidence in the usability of other figures as well. Perhaps it also reflects a substantial, and surprisingly rapid, population movement after the conquest from other parts of the Sawad into the Kufa region. However, that also implies the massive disruption of an enormous, finely tuned irrigation system, with no possibility at all that its productivity could be sustained without a lengthy transitional period of reconstruction.

The Muslim population at this time was still heavily concentrated in and immediately around the new garrison cities of Kufa and Basra. In the time of Ziyad there are reported to have been 80,000 soldiers and 120,000 dependents at Basra and 60,000 soldiers and 80,000 dependents at Kufa. 'Ali's slightly earlier registration of the Kufan army in 658 placed 57,000 Arabs (including 17,000 youths) upon its rolls, but only 8,000 slaves and converts. (Morony 1972, chap. 2, sec. 3). Many of the women, to be sure, must have been of Persian or indigenous stock. But these cities stand out as swollen foreign enclaves of an exceptional character, abruptly superimposed on the pre-existing urban hierarchy and only very gradually becoming an organic part of it.

If we assume that most poll-tax payments were in the lowest category, some 85 to 88 million dirhams would have had to be supplied from the land tax on the Sawad of Kufa. There is no way to determine the real taxable area on which the commissioners depended, but their new rates certainly simplified their problem. Assessments went up in every category, and in addition they were newly imposed on a number of crops (e.g., cotton and sugarcane) that had not been taxed earlier. Wheat quadrupled to 4 dirhams per jarib, while barley doubled to 2. A new tax of 1 dirham for each 2 jarib of uncultivated land signals Muslim concern over what must have seemed a ubiquitous and disturbing process of abandonment. The tax on vineyards rose more slowly, from 8 to 10 dirhams per jarib, but the rate trebled on ordinary palms and quadrupled on the finer "Persian" variety. And steep as these increases were, they failed to take into account the further effect of the reduction in the size of the jarib. This alone would have served to increase the real tax burden by almost a third (Morony, n.d., chap. 1, sect. 2).

Following a procedure similar to the one introduced for the Sasanian tax schedules (above, p. 202), we can tentatively set aside secondary crops to reach a judgment on the orders of magnitude involved. Let us further suppose that wheat and barley were of equal extent and occupied perhaps 40 percent of the taxable area. The rate for unoccupied land can perhaps be supposed to apply to an equal total area of cereal lands left in alternate fallow.

Cereals (including fallow) then would have produced 1.75 dirhams per jarib in taxes. Date orchards are more of a problem. We are told that they paid between 5 and 10 dirhams per jarib, which at the stated rates of 1 dirham per finer palm and ½ dirham per ordinary palm seems to imply a density of only 95 palms per hectare. This is close to the United States standard of 100 per hectare, but that spacing is designed for a setting where water is plentiful and emphasis is on producing uniformly high-quality dates for a competitive market. It contrasts sharply with modern densities of about 450 per hectare in the Basra region and with the Neo-Babylonian standard used earlier of about 227 per hectare (Wilkinson 1977, p. 93; above, p. 186). Does it imply a deterioration in orchard management after the conquest? Alternatively, the density could have been set at an unrealistically low level precisely to stimulate date cultivation. Steeply reducing the rate as calculated per unit area while increasing the rate per palm would, in effect, provide a powerful inducement to growers to intensify their date production by planting more palms within a given area.

Setting aside that tantalizing but for the present unanswerable question, we can further suppose that an average orchard income of 8 dirhams per jarib was representative of the remaining 20 percent of the land not devoted to cereals. On this basis, average receipts would have been 3 dirhams per jarib and the roughly 85,000,000 dirhams that were reportedly raised in the Sawad of Kufa (after allowance is made for the poll tax) would have required a tax base of more than 28,000,000 jarib, or about 29,400 square kilometers of cultivable land. This is so slightly above the maximum limits of the Sawad of Kufa as calculated from Euphrates drainage patterns as to lie within an acceptable margin of error. But if due account is taken of the very considerable areas to which the land tax did not apply, it suggests either that the reported level of receipts was a formally recognized but unrealizable goal or that the rates applied in practice were often still higher than those specified.

Perhaps reinforcing these speculative reconstructions are the next figures available to us, breaking down by region the state income during the caliphate of Mu'awiya (661–80). The whole of the Sawad at that time paid 120,000,000 dirhams, little more than that reported earlier for only Kufa. There are wide discrepancies in different reports of the amount of taxes Hajjaj was able to collect from the whole Sawad at about the end of the century, but again under 'Umar II (717–20) we learn of 124,000,000 dirhams.

Morony, who is inclined to accept the Muslim figures but to remain skeptical of the Sasanian ones, concludes that the Muslims probably managed to maintain something close to the earlier level of state income. He does not question that there was some decline in the gross cultivated area ultimately constituting their main tax base

but believes that they would have been able to compensate in part by driving up the rates. Citing Ya'qubi's report that annual income from state-held lands in Iraq and its dependencies during the reign of Mu'awiya amounted to 100 million dirhams in addition to the land tax, he further observes that there had been a dramatic extension of state property and the importance of its income as a result of vigorous land reclamation policies. There is also reference to large reclamation projects that were carried out by private developers and that similarly remained outside the land-tax system (n.d., chap. 1, sect. 2). Clearly, it would be an error to use receipts from the land tax as a measure of all forms of agricultural activity. It seems quite certain that the land tax was levied on a substantially higher proportion of Sasanian production than was the case under the radically altered conditions after the conquest, even if the extent of the subsequent reduction cannot yet be exactly specified.

The area involved in Islamic reclamation projects apparently lay mostly on the lower Tigris north of Basra, and perhaps to a much lesser extent on Euphrates outfall channels into the Great Swamp south of Kufa. Surveys have not yet been conducted in either of those regions, so that there is as yet no archaeological basis for estimating the relative proportions of Sasanian and Early Islamic settlement there. The evidence for a very substantial decline in land use in the central Euphrates floodplain (and to a somewhat lesser degree in the Diyala region) appears to lend additional support to reports of a level of Sasanian state income considerably higher than could be attained afterward. If this central area were fully representative, in fact, a serious decline in income would have been inevitable no matter how repressively the Muslims raised the rates. But with future surveys (assuming they are feasible in the Amara swamps and the dense palm groves north of Basra) we may indeed find instead that for some centuries after the conquest the absolute decline remained relatively modest, with the precipitous plunge beginning only in the late ninth century. In that case the types of state income would merely have shifted in their proportions, with new categories being introduced to match a final shift of settlement away from the age-old domain of cities along the tangled web of former Euphrates levees in the center of the alluvium.

In the end, then, we must turn once more to what archaeological evidence is available at present. It has already been shown that the overall decline in the aggregate occupied area within the intensively surveyed area after the apogee of the Sasanian period had reached about 94 percent by the eleventh century or so and that the larger, presumably more "urban" centers were particularly hard hit. But the mapped sequence of changes provided in figures 47, 48, 49 and 50 may carry some additional impact of its own.

The first of this series summarizes what is known of

the distribution of Islamic settlements in most of ancient Babylonia. It omits the region between Baghdad and Samarra that became increasingly pivotal, the Diyala plain fed by the gigantic Nahrawan canal system, and the entire area east of the Shatt al-Gharraf and along the lower Tigris that included Wasit and Basra. Moreover, though Kufa itself is shown, the region around it still has to be left virtually empty of contemporary recorded settlements. In other words, the surveyed terrain shown here falls in the interstice between most of the major centers of Islamic development. Certainly figure 47 cannot be regarded as adequately representing what went on around these centers. The same is even more true of the following three figures, which are confined to the still more limited geographical frame of the intensively surveyed region. But the scale of the decline that these figures do conclusively document is nonetheless of great importance. In them we see the virtual abandonment of an area of perhaps as much as 10,000 square kilometers, which for millennia had constituted the vital hearth of a rich and ancient civilizational heritage.

The sequence of steps by which this abandonment was effected is left somewhat obscure by ambiguities in the dating of Sasanian and Early Islamic surface collections. There are unresolved questions, discussed in the appropriate sections of the appendix to this chapter, that have a direct bearing on more general interpretations that might be offered here. Broadly speaking, however, four phases can be distinguished even if their chronological boundaries remain somewhat elastic and questionable. The first and most extensive is the essentially late Sasanian pattern (fig. 45) that has already been dealt with. The foregoing discussion of the disruption accompanying the Muslim conquest seems to imply that the most significant retractive step between that phase and the next (fig. 48) coincided fairly closely with the conquest itself—naturally including the years that immediately followed before a knowledgable, effective, centralized agrarian administration could be reestablished. The chronicles seem to oversimplify grossly the protracted series of steps by which the southern part of the alluvium gradually was converted to lightly occupied swamps, but numerous references to disastrous floods in 628 (Le Strange 1905, p. 27) may highlight an especially serious episode that overcame the recuperative powers of the system just a few years earlier. In any case, the degree of specificity thus suggested is quite beyond what the surface collections can be expected to show, at least at this methodological juncture. On the basis of the collections alone, it is equally possible that extensive abandonment had already gotten under way in the terminal years of the Sasanian period, or, alternatively, that there was a slower but continuing process of withdrawal that continued through the seventh century and much of the eighth.

With the second phase, here termed Early Islamic, a

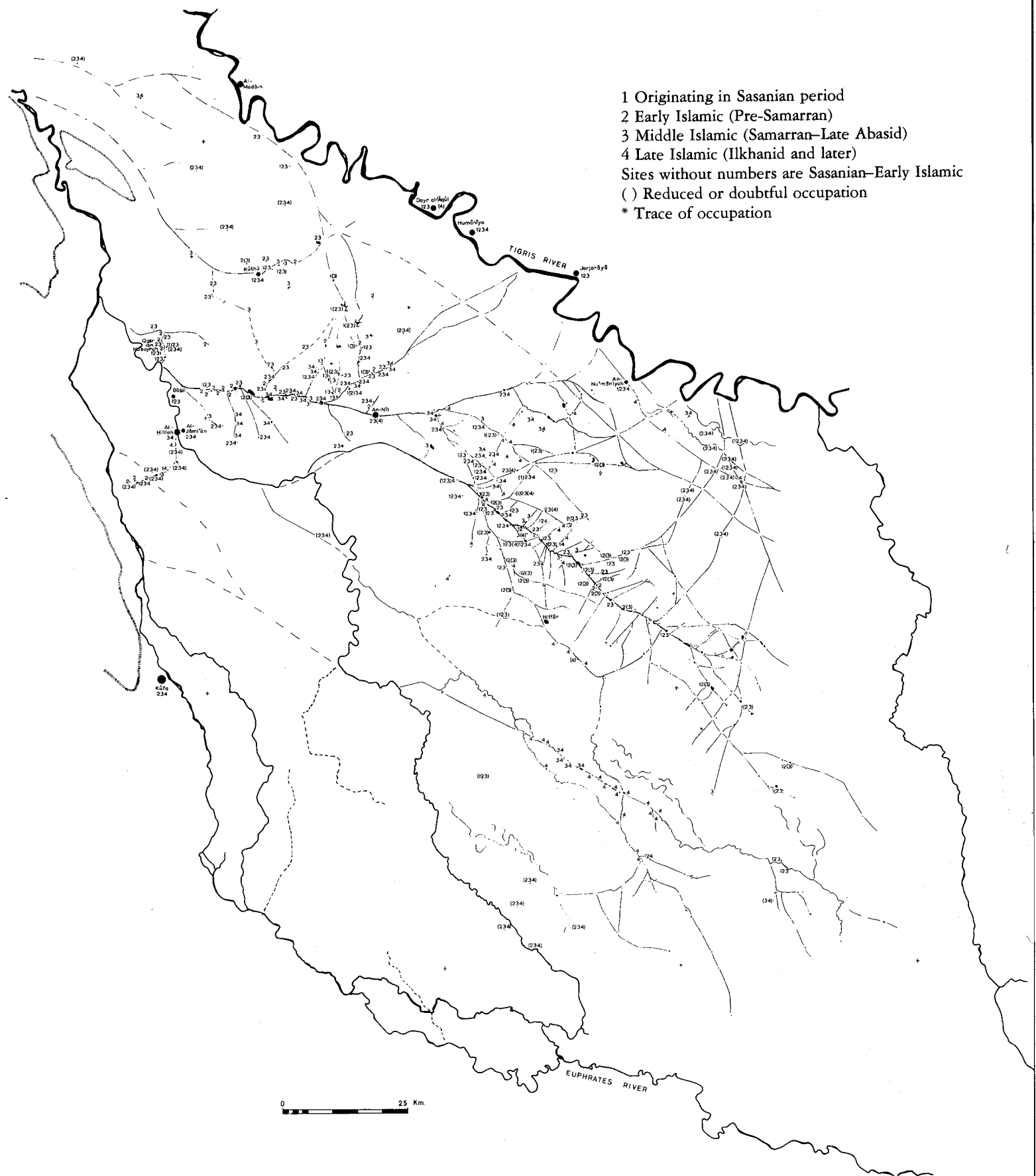


Fig. 47. Islamic sites and watercourses on the Mesopotamian plain.

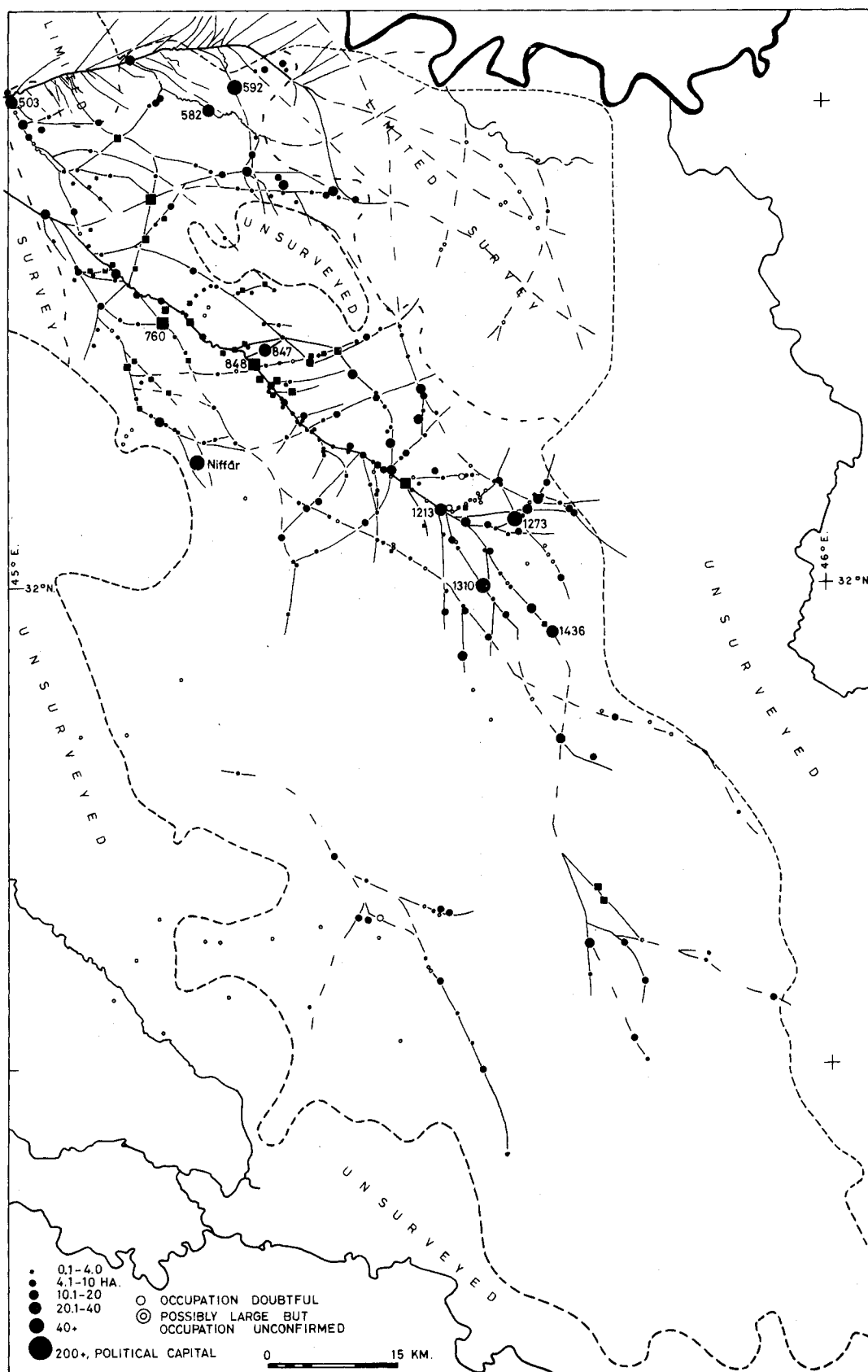


Fig. 48. Early Islamic period settlement patterns in the intensively surveyed region.

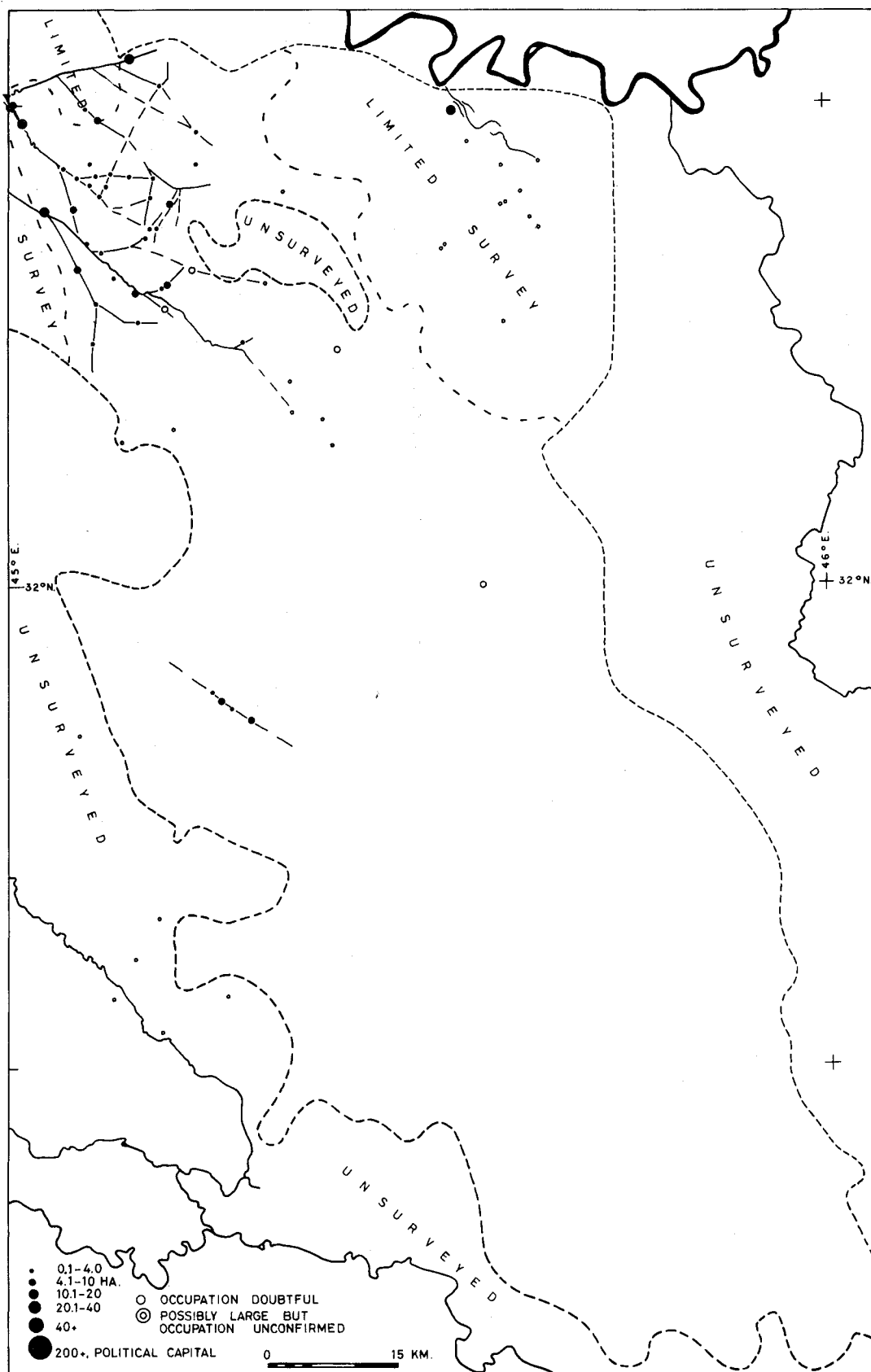


Fig. 49. Middle Islamic period settlement patterns in the intensively surveyed region.

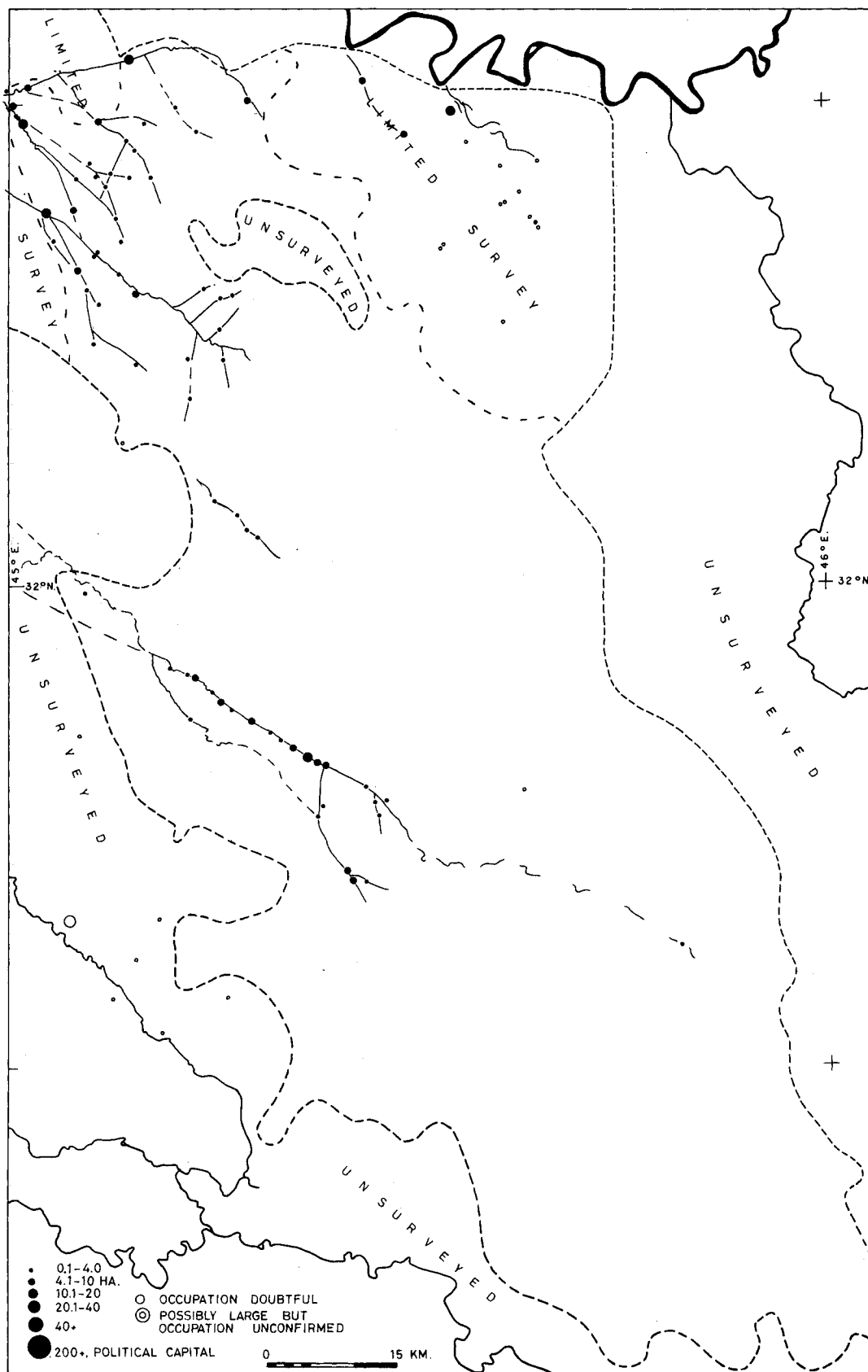


Fig. 50. Late Islamic period settlement patterns in the intensively surveyed region.



decline had been generally experienced but was by far the most severe in the southern part of the region. Isolated settlements remained there but probably were limited to the crests of old levees in a more and more extensively flooded countryside. Supply canals entering the area from the lower Euphrates to the west seem no longer to have been fully functional, and quite possibly the occupied areas existed only as enclaves with swamps upstream of them as well as below them. Farther north, extending to somewhat below the latitude of Nippur, the surface evidence suggests a substantial thinning out of settlement even though there the general growth of swamps cannot have been the immediate causative agency.

Evidence is offered in the appendix to this chapter for the view that this pattern prevailed for some time into the ninth century. On numismatic grounds, one might expect that the onset of the next massive phase of withdrawal had occurred before the middle of the century. On the other hand, as Waines notes, the "hard evidence" for peasants leaving the land dates only from the "civil war" and siege of Baghdad in 865. This, he maintains, "wiped out any notion that the government's reciprocal function of protection could be honoured" and "clearly triggered the prolonged rural reaction over the next decades" (1977, pp. 298-99). Only three years later, the Zanj slaves unfurled their banners and took up weapons in the southern marshes (Popovic 1976).

Comparison of figures 45 and 48 indicates that there were significant changes in the sources of water for the intensively surveyed region. The bed of the Nil canal is to be seen at the northern end of figure 48, continuing the line of the Great Sarat canal eastward to al-Nu'maniyah. As I argued earlier, the original feeder supplies for the entire region had come in the main from the northwest. That approach was cut off with the construction of the Nil, at the beginning of the eighth century if its attribution to Hajjaj is justified.

Presumably the new source that was found on the Euphrates below Babil and the modern town of Hilla (fig. 47) was developed at the same time that the Nil was dug. It is not clear why this was done, since the old Nars network could have been supplied by joining it directly to the Great Sarat-Nil canal, in the immediate vicinity of the city of al-Nil. Perhaps that was done for a time, with the more laborious offtake to the west being created only later. But the Arabic 1:50,000 maps covering the al-Nil area fail to indicate a levee supplying the interconnection, and I have been unable to examine the relevant air photographs.

The third phase is combined with the second in figure 48. Sites that are shown with a square instead of circular symbol contained at least a few sherds of "classic" Samarran sgraffiato pottery. As is noted more fully in the appendix to this chapter, this pottery seems fairly certainly to have been introduced on a considerable scale while

Samarra was still the imperial capital; that is, before 893. On the other hand, it may well have been in use, particularly in what was now becoming a remote, depressed rural region, until at least the end of the tenth century.

The settlement pattern suggested by this "Samarran" pottery may involve some slight withdrawal farther northward. Primarily, however, there was a very rapid thinning out of settlement throughout the whole region. As table 18 indicates, the Samarran pattern is comparable in density to that of the late 'Abbasid period. Taken at face value, the figures for the tenth/eleventh century occupation even suggest that this came nearest of all to total abandonment. But the difficulty is that the Samarran sgraffiato ware of "classic" pattern on which the identification of the period largely depends is a trade ware of limited distribution rather than a widely made (and imitated) utilitarian ware. Though relatively common even on some quite small sites in the Baghdad region, it is almost always limited to one or two sherds in surface collections from apparently contemporary settlements in south central Iraq. Hence its absence at a particular Early or Middle Islamic site within the intensively surveyed region cannot be taken as a reliable indication that the site was abandoned during the later ninth and tenth centuries.

Little can be said about the following two figures, for they illustrate no otherwise identifiable settlements and cannot yet be articulated with known events or streams of recorded tradition. Sedentary occupation of the central plain between the Tigris and the Euphrates, from A.D. 1100 or so until the onset of substantial tribal resettlement in the seventeenth century, had little substance or significance. Continuity was all but broken off, certainly in the urban and civilizational patterns of life that had flourished there so precociously, but probably also in the much more rudimentary sense of continuous habitation of individual communities.

However, it would misrepresent the nature of later achievements to conclude this account by focusing exclusively on the near abandonment of the central Euphrates floodplain. Coinciding with that process of almost continuous demographic decline and withdrawal was, after all, a lengthy and initially flourishing, if ultimately also deteriorating, epoch of Islamic world culture under first the 'Umayyad and then the 'Abbasid caliphates. With the movement of the cultural as well as political centers to other regions, there is some justification for dismissing the south central part of the Tigris-Euphrates alluvium as insignificantly marginal. It is to the hinterlands of the greatest of the new centers, Baghdad, that we must turn for the culmination as well as the denouement of the record of Mesopotamian urban settlement.

Figures 51, 52, and 53 summarizes this later, and substantially different, chapter of the record. They are based on the newly detailed mapping of ancient watercourses

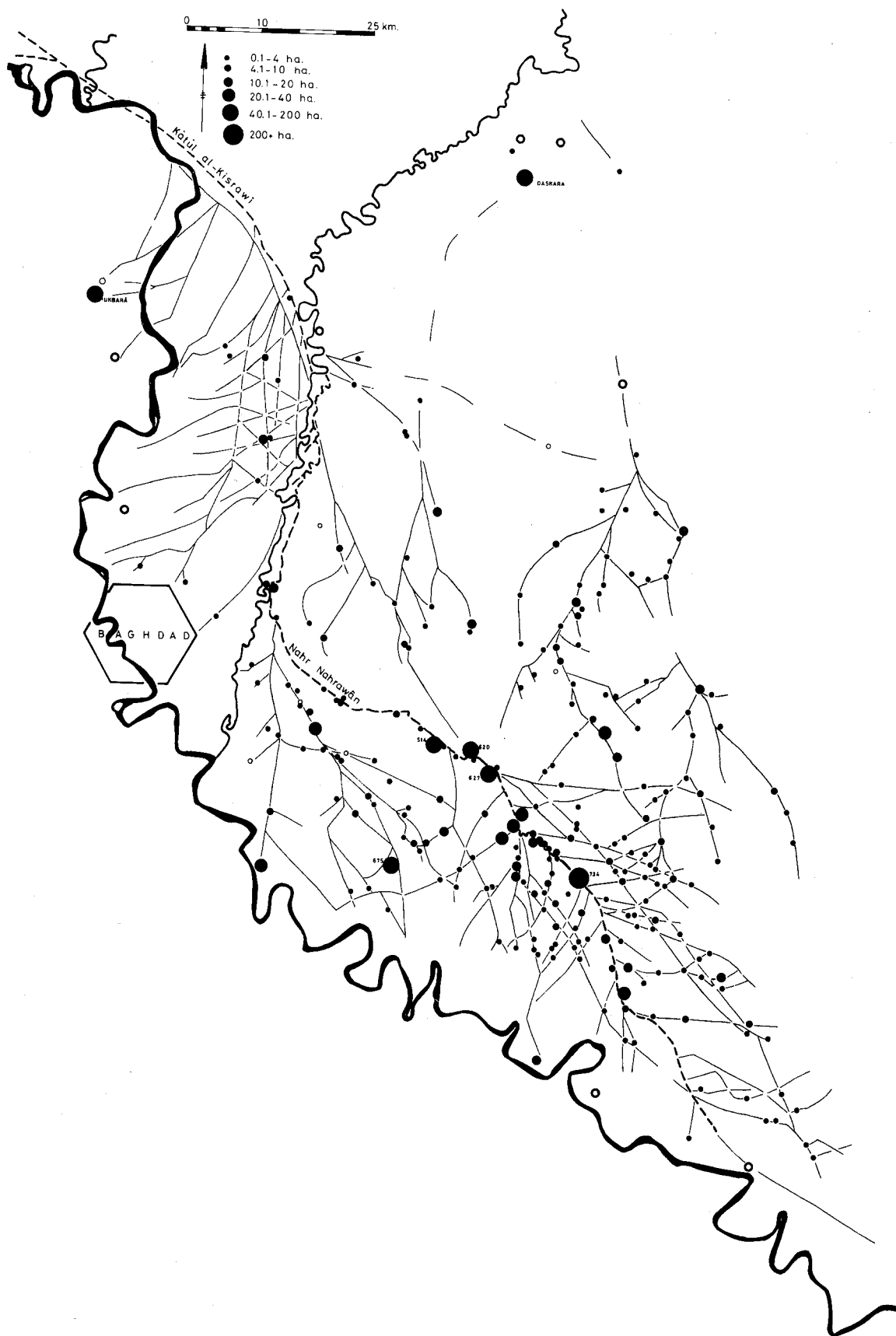


Fig. 51. Early Islamic watercourses and settlement patterns on the lower Diyala plain.

in the Diyala region (fig. 8) that has been drawn up largely on the basis of the aerial photographs. Baghdad itself is only schematically represented. At the height of its prosperity early in the ninth century it probably dwarfed by a full order of magnitude, in area if not in population, any earlier or contemporary Mesopotamian city. This enormously swollen scale of growth may well have had a number of distorting effects on the surrounding region. There is a puzzling absence of subordinate small settlements around its periphery, for example, where one might expect intensive truck gardening to supply the vast, diverse, and discriminating Baghdad markets. Baghdad's hyperurban character in many political and cultural respects notwithstanding, perhaps we must think of a substantial element of its population as being commuters-in-reverse who were employed primarily in agricultural pursuits (albeit commercial rather than subsistence-oriented ones) for considerable distances into the surrounding countryside.

The map illustrating the Early Islamic period (fig. 51) reflects the mature impact of the Katul-Nahrawan canal system. Apart from the buildup of Baghdad after the mid-eighth century, evidently there was also a gravitation of settlement toward more distant parts of the region and especially into the middle-lower Nahrawan district. In the neighborhood of Uskaf bani Junayd (Diyala site 734), the largest urban center on the Nahrawan, a proliferation of villages and small towns indicates a type of colonization different from that of the Parthian and Sasanian periods. Whatever its nature, the result was that here the rural population density reached higher levels than it had ever previously achieved. Yet the map shows that a large area to the north of the upper Nahrawan was at the same time extensively depopulated. The familiar lesson to be drawn, applicable to other periods and on many geographical scales, is that it is hazardous to generalize about population trends from localized and hence often unrepresentative data.

The Diyala settlement and watercourse patterns of the Samarran and late 'Abbasid periods have been combined on a single map (fig. 52). This was an era of retrenchment, punctuated by repeated major crises and minor episodes of restoration (Adams 1965, pp. 84-89), and important canal-cutting initiatives or extensions of the agricultural frontier could hardly be expected. Sites largely or wholly abandoned after the earlier, Samarran part of the interval have been designated E, and it is apparent from their distribution that there was a massive abandonment of virtually the entire middle-lower Nahrawan region not long after Samarran times. The accompanying deterioration of the irrigation system has been described in detail elsewhere (Adams 1965, pp. 99-105). Only along the tails of what later became known as the Khorassan canal, paralleling the Diyala to the east, do sites primarily dating to the post-Samarran period (designated L) give some in-

dication of a modest reopening of older channels and resettlement of a district that had for some time been nearly abandoned.

Only for the late 'Abbasid period can the bed of the Tigris through the 'Ukbara region north of Baghdad be specified with reasonable certainty. Numerous traces of superimposed meanders, accompanied by substantial ancient settlements, suggest that the main Tigris course had been in this vicinity for a very long period (cf. fig. 8). It has not yet been possible to work out the respective ages or even the relative sequence of the earlier meanders, but the final bed that was abandoned when the Tigris moved eastward about A.D. 1230 can be distinguished from the others. This is the one shown in figure 52. Several meanders in its upper part are far too small for the Tigris and typical only for a stream like the Diyala. They suggest that for some time before the complete shift to the new bed the course of the Tigris was bifurcated, with most of the water following approximately its modern course while a vestigial flow was somehow retained in the 'Ukbara channel.

Figure 53, finally, traces the general withdrawal of settlement that had been consummated by the Ilkhanid period, after A.D. 1258. After its sack in that year by the Mongols under Hulagu, Baghdad had shrunk back to being a city of fairly modest size rather than a metropolis, and most if not all other settlements in the region are better classed as villages and towns rather than as cities. The Katul-Nahrawan system had altogether ceased to function, and with its closure the entire southern part of the lower Diyala region (excluding a narrow and discontinuous fringe along the Tigris) disappears from the settlement record. The pattern of withdrawal and breakup that had all but obliterated the central floodplain as a locus of sedentary life three centuries earlier was by now threatening to engulf even the immediate environs of Baghdad. And, apart from Baghdad, it was only in a few desperately poor, increasingly tribalized enclaves that a precarious degree of continuity was maintained until the beginnings of the modern era.

Running through most accounts of European travelers who passed through any of these struggling settlements on the threshold of our times is a tone of disdainful superiority. Partly this must reflect their consciousness of an elemental disjunction between the glories of the past that they envisioned and the contemporary impoverishment that they unquestionably saw. But partly also their tone must reflect cognitive constructs that were fashioned out of the acquisitive and expansionist aspirations of their own societies (Said 1978). They were generally on a kind of pilgrimage to ruins of ancient cities that held a high place in their own cultural and religious heritage, and so it should not be surprising that they idealized the more remote past. With this, however, all too often went an implicit assumption that they were its principal heirs

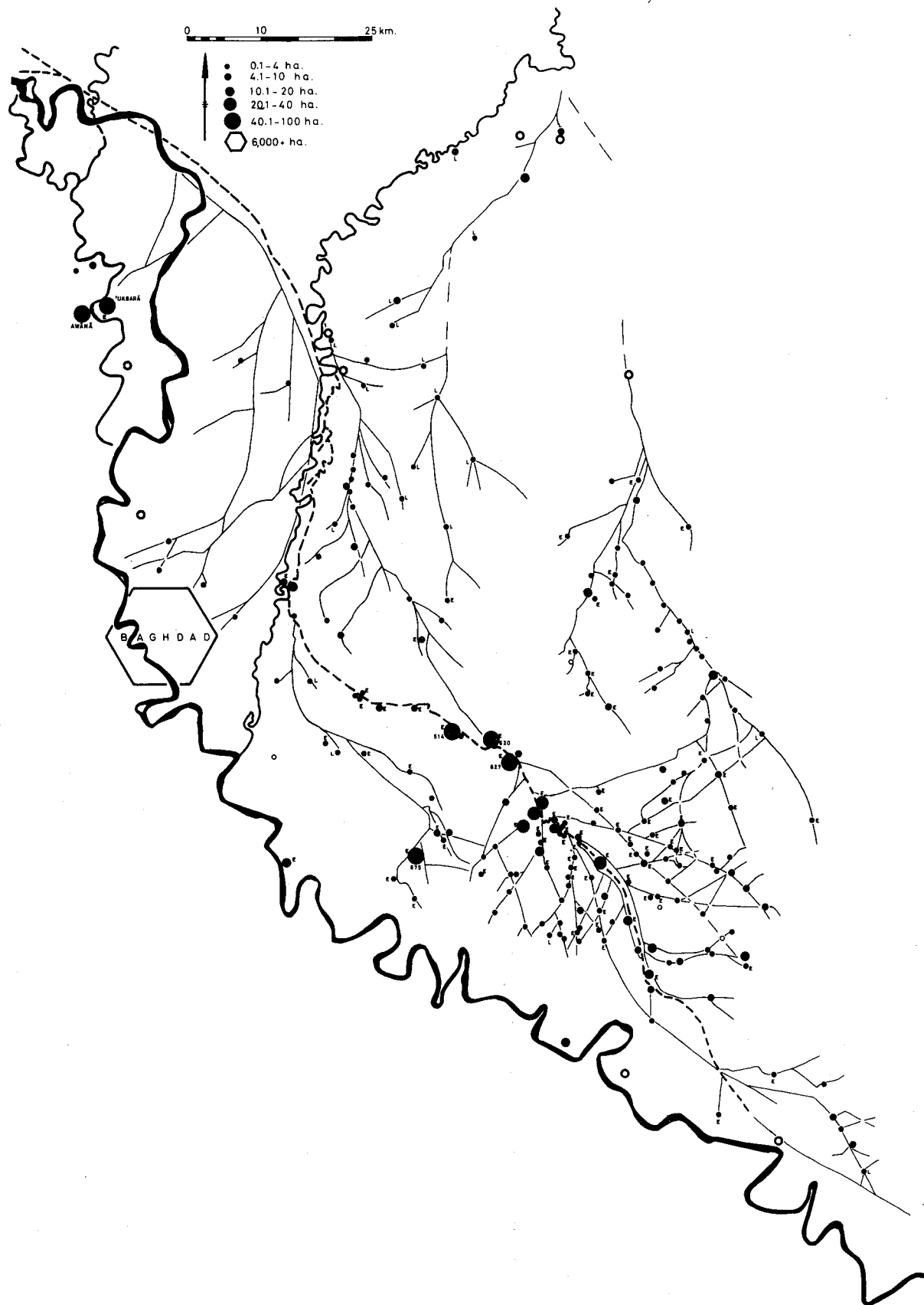


Fig. 52. Samarran-Late 'Abbasid watercourses and settlement patterns on the lower Diyala plain.

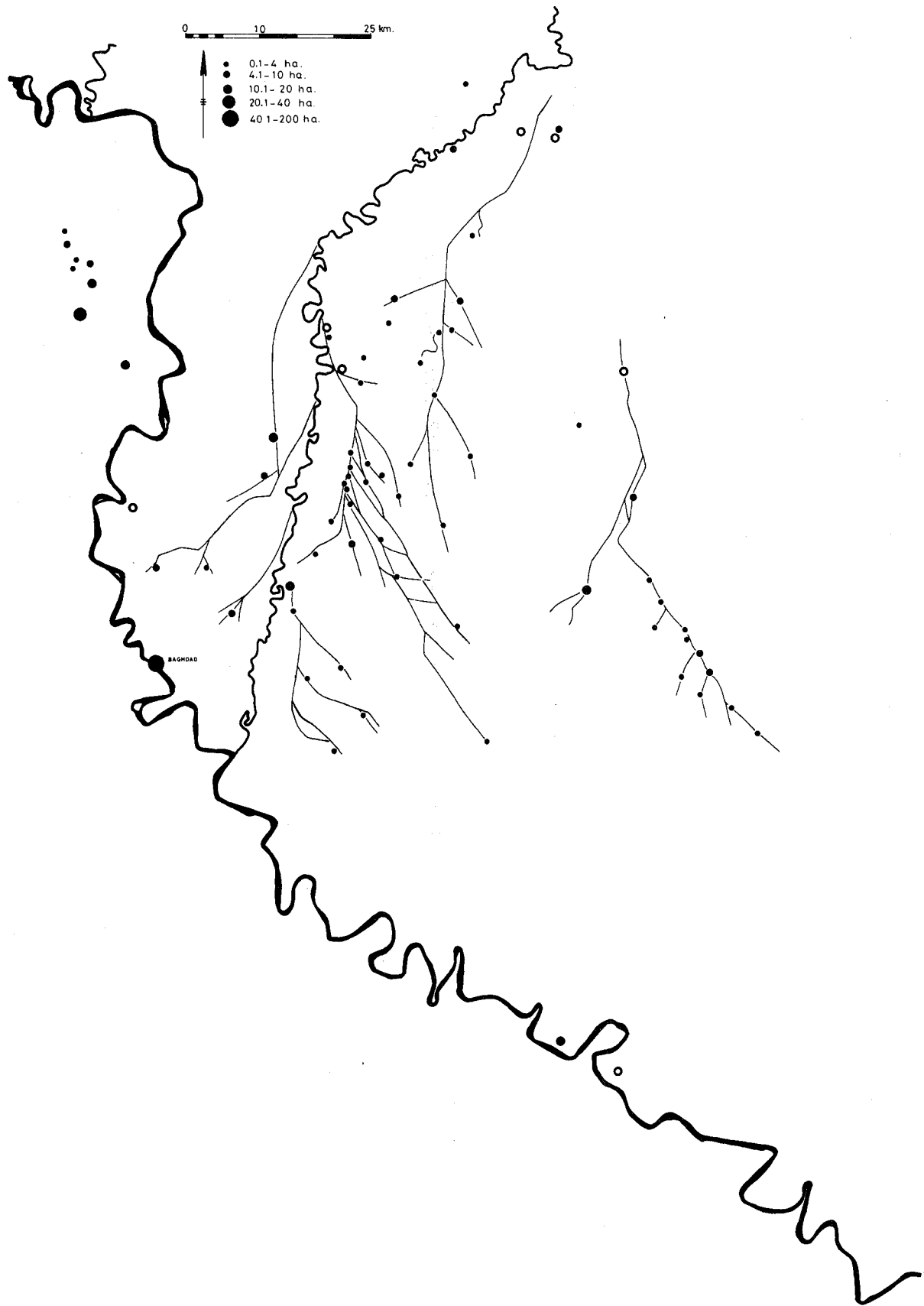


Fig. 53. Ilkhanid watercourses and settlement patterns on the Lower Diyala plain.

and a disbelief that others could exercise any real claim to share in it. And with such attitudes in turn there tended to be a pervasive lack of interest in the achievements of intervening ages that would have established lines of inheritance fully paralleling their own. Still awaiting anything remotely approaching adequate study, therefore, are the immense irrigation, urban, and other achievements

of the Hellenistic era and early Middle Ages to which much of this chapter has been devoted. Even in a region that we primarily identify as the oldest urban heartland, those later remains—and the civilizations responsible for them—must be regarded in the end as no less impressive than all their predecessors.

## A P P E N D I X

### THE SURVEY DATA BASE: NEO-BABYLONIAN-LATE ISLAMIC SITES AND CHRONOLOGICAL INDICATORS

The archaeological data employed in this chapter are fairly heterogeneous and in part of quite inferior quality. Published, securely dated sequences of common, utilitarian ceramic types that would be especially useful for dating surface collections are on the whole conspicuously absent. Much less archaeological attention has been devoted to remains of these later historical periods, in fact, than to the periods covered in the preceding chapters. From Seleucid times onward, the availability of coins ultimately will prove an inestimable advantage for dating purposes, even though examples found on the surface frequently are too corroded for even very partial or provisional identification. But at present, in any case, there are too few associations of coins with excavated ceramic assemblages to provide more than occasional indications of the full spans of popularity of types occurring in the latter.

Apart from the widely differing degrees of certainty with which surface collections can be assessed, there is likely to be a cumulative improvement in the proportion of sites recovered for progressively later periods. In part this is simply a matter of more recent remains being somewhat less likely to be obscured by various later forms of surface aggradation. This effect is not likely to be large, since the complex of ongoing erosional as well as aggradational processes has made it possible to trace in detail the remains of many much earlier sites on which chapters 3 and 4 are based. Much more significant was the gradual acceleration in the use of baked bricks, not merely for public buildings but for at least the footings or lowermost wall courses of ordinary houses. Occasional surface finds of baked bricks date to the third millennium and even earlier, but as late as the mid-first millennium they can be described as common only on a handful of the very largest centers. Their frequency increases perceptibly in Seleucid-Parthian times, and by the Sasanian period it is rare to find even a relatively small site without some evidence of their use. Finally, in the Islamic period they litter the surface profusely and often are sufficiently pre-

served in their original positions to permit the extensive tracing of building plans with little or no surface clearance (cf. site 1013 in chap. 7). The significance of this increasing use of brick is twofold. In the first place, it greatly retards wind erosion and thus preserves mounds to a greater height than would otherwise be the case. Second, it adds a characteristic irregularity to the surface remains of former settlements that is noticeable from a great distance in the desert. For these reasons the rate of recovery of later sites obviously must be greater.

Apart from these few generalities, an account of the survey data base for the later historical periods must deal with conditions so varied that a discussion of their combined features would be misleading. It seems more appropriate to deal separately with the catalog of sites pertaining to different periods or groups of periods, appending to each separate section a discussion of the ceramic "index fossils" on which site identifications have been based.

#### *Neo-Babylonian, Achaemenian and Seleucid-Parthian Periods*

Chronological indicators are especially ambiguous for this long span of time. An attempt was made to differentiate successive periods within it on the basis of what is known of ceramics associated with dated building complexes unearthed in excavations. But the dating of the ceramics admittedly remains very slippery, as I have already noted in the foregoing chapter. This is reflected in our inability to prepare separate maps for settlement distributions in the Neo-Babylonian and Achaemenian periods and in considerable uncertainty as to the array of settlement data that properly should be assigned to the Seleucid period.

With respect to the partial conflation of Neo-Babylonian and Achaemenian data, for most purposes it is probably sounder to combine the sites attested for either period into a single list. Moreover, as is noted once again below, the possibility must be conceded that some

of the traits associated with either or both of these periods may have been introduced somewhat earlier than the political events by which the onset of the Neo-Babylonian period is normally defined. Fortunately, this last difficulty is likely to have a very limited effect on the interpretation of settlement patterns for this period, since most of the vigorous growth that occurred would hardly have been possible during the later years of the Neo-Assyrian occupation.

Turning to the Seleucid-Parthian period, it should first be noted that well-attested ceramic indicators are in fact largely limited at present to the Parthian period alone. There is known to be considerable continuity between types occurring in Achaemenian and Seleucid contexts, and again between Seleucid and Parthian contexts. At this juncture, lacking adequate corpora of excavated, securely dated Seleucid pottery from this region, we simply cannot state with much conviction that Seleucid collections are more similar to those of the following Parthian period than to those of the preceding Achaemenian period. Hence grouping "Seleucid" and Parthian sites together, as I have done consistently throughout this discussion, may involve mainly Parthian remains and very little that is Seleucid in date. If that is so, Achaemenian and Seleucid instead should have been hyphenated and the Parthian period might better have been treated independently. The uncertainty obviously affects any developmental as well as historical explanations that may be offered on the basis of survey data, basically requiring that very little be said about the Seleucid period. Again, however, there may be a slight compensating stroke of fortune in that such numismatic evidence as there is from outlying sites in at least the Nippur region points to more substantial Parthian—and specifically late Parthian—than Seleucid activity.

In short, there is a lengthy span lasting from approximately the seventh century B.C. until perhaps the second century B.C. during which the chronological placement of sites on the basis of their surface collections is not very reliable. This is not to say that sites actually occupied within this span have in general been assigned to a different one (or vice versa), but only that attempts to impose internal time divisions within it may well be questioned. I will note in a later section of this appendix that there are a variety of other problems with properly dating ceramic indicators for the Parthian, Sasanian, and Islamic periods. In at least a narrowly archaeological sense, however, these problems are less serious in that the relative sequence is quite firm so that controversies arise only from the need to assign absolute dates.

There is a further difficulty with Neo-Babylonian, Achaemenian, and Seleucid-Parthian sites, affecting the areas that have been recorded for them. Not infrequently, the remains of all three periods are heavily blanketed by massive, overlying Sasanian occupations, making esti-

mates of size problematical. There was a like difficulty with many of the sites relevant to chapter 4, dealt with in that case by assigning fairly broad size categories rather than making specific estimates of their dimensions in a given period. The same procedure is followed once more in the accompanying tabulation (table 20). But the difficulty with it in this case is that, as described in greater detail in the foregoing chapter, the character of settlement itself seems to have undergone a change during the periods with which we are dealing.

In becoming normally less nucleated, more amorphous and sprawling, individual settlements frequently comprised a number of scattered mounds rather than a continuously built-up area. This difference is too easily overlooked when sites are described in terms of gross size categories rather than more precise areas, and, in particular, the discontinuous, sprawling type of ruin is seldom apparent beneath a later overburden of Sasanian debris. Hence the settlement areas credited to such sites may be disproportionately larger than those listed in chapter 4 for others that were actually of comparable size.

The problem is probably relatively most serious during the Parthian period. Neo-Babylonian and Achaemenian sites are generally more regularly bounded and contoured—more similar, that is, to the earlier pattern of traditional Near Eastern "tells." Sasanian occupations, generally being the largest of all, are much easier to record accurately. The limits of Islamic sites can be easily followed merely by observing the presence of highly distinctive glazed wares, which in any case generally trace out circles of declining circumference with little or no later overburden. Even for the Parthian period, however, this is probably a source of fairly modest errors. Only 19 percent of the "nonurban" Parthian sites (categories 1 and 2 in the table) were masked by a Sasanian occupation of equivalent or larger size, although in the "urban" categories the proportion increases to 36 percent. In any case, a column has been added to the tabulation referring to "terminal" occupation in order to call attention to those sites whose assignment to a particular size category is not open to doubt because of a larger, later occupation.

Turning to the ceramic indicators on which the determinations in table 20 are based, there is every reason to believe that individual traits attributed to the Neo-Babylonian period may already have appeared during the preceding century or so of Neo-Assyrian hegemony and may have continued into Achaemenian times or even later. This is in fact what the ceramic sequence at Nippur strongly suggests: there is not a single type of exclusively Neo-Babylonian date, and only one quite minor one that even can be limited to the Neo-Babylonian and Achaemenian periods. On the other hand, no less than thirteen types can be attributed to all or some part (including the Neo-Babylonian period) of the span represented by the so-called Assyrian (something of a mis-





nomer), Neo-Babylonian, and Achaemenian periods, while apparently not extending outside this span (McCown and Haines 1967, table 2). Clearly, there is a reasonably satisfactory group of dating criteria available provided one is content with a span of attribution not limited to the duration of the dynasty but instead extending over three or four centuries. This greater imprecision will be found reflected in the discussion of the relevant surface remains in chapter 5.

Five ceramic traits were used during the survey as diagnostic of the Neo-Babylonian period: Outflaring jar or bottle necks with rounded or rope rims, usually with one or more sharp-edged horizontal ridges at the middle of the slightly concave neck or in the transition zone between the incurving neck and the outcurving shoulder (McCown and Haines 1967( pl. 102); small, irregular pierced-lug or rope-loop handles, attached either at jar rims or on sloping shoulders (McCown and Haines 1967( pl. 104); deep, flaring, thin-walled bowls with short, concave upper sides and near-vertical rims, sometimes with traces of whitish or greenish glaze (Adams 1965, p. 129); thickened or rope rims on narrow-diameter jug or bottle necks (McCown and Haines 1967, pls. 104, 105); and lamps, usually unglazed (McCown and Haines 1967, pl. 102). Burials in large urns also make their appearance at about this time, and fragments of the urns are often seen on the surface.

Many if not most of these Neo-Babylonian types must be equally applicable to the Achaemenian period. Four additional traits were identified with an Achaemenian occupation: subhemispherical or somewhat flaring bowls, carefully shaped of an extremely thin-walled, well-leveled clay (McCown and Haines 1967, pl. 103:13-14; McCown, Haines, and Biggs 1978, pl. 50:11); a variety of stamps and medallions applied, usually in a single horizontal band, on the concave, frequently profiled upper sides of round-bottomed, flaring bowls (McCown and Haines 1967, pl. 103:9, 16); horse figurines, frequently with schematically modeled riders (McCown and Haines 1967; pl. 141:10; McCown, Haines, and Biggs 1978, pl. 72:12); and "husking trays" with interior pecking or scoring and frequent evidence of heavy abrasion.

Turning to the Seleucid-Parthian period, essentially the same substantial distinctive set of characteristics that were originally applied to surveys in the Diyala region (Adams 1965, pp. 130-31) were applied once more. It is apparent that greatly improved differentiation of the dozen or so recognizable traits into shorter time periods will ultimately be possible. R. J. Wenke has in fact made an impressive advance in this direction even without excavations, applying multidimensional scaling and matrix-ordering to intensive surface collections from the Susiana plain while relying on surface finds of dated coins for chronological placement of his types and assemblages. Wenke finds that comparison with Mesopotamian sites

such as Seleucia tends "to support the general outlines" of his own study some 360 kilometers east-southeast. He goes on to concede, however, that there are "vast differences" between the pottery types characteristic of the two areas, with some major types in one having "no real counterparts" in the other (1975-76, p. 78). Hence it is not possible to use his findings as a basis for refining the sequence in southern Mesopotamia at present; he merely points the way to the great progress that a systematic effort comparable to his would permit.

It is perhaps worth noting the purely subjective impression that both Parthian coins and contemporary glazed wares of all kinds are significantly less common in the region covered in this survey than in Akkad and the Diyala region. Quite possibly the greater propinquity of both of the latter to the capital at Ctesiphon was the major factor accounting for this difference.

Largely reiterating the criteria used in the Diyala region for the sake of completeness, they are as follows:

Broad-line impressed decoration in a sawtooth or chevron pattern beneath thin Parthian-green glaze. (Surface examples of Parthian glaze are almost always green, while excavated specimens are frequently blue or blue green. Clearly, there is a factor of weathering that needs to be borne in mind.)

Carved, low-relief decoration, triangular excisions, and applied buttom decoration beneath Parthian-green glaze.

Single or double "twisted rope" handles, generally covered with a thin Parthian-green glaze.

Thin, flaring bowls with a slight projecting elbow or carination below a simple vertical rim.

Dishes or shallow bowls with flaring sides and beveled or downflaring rims, usually with light greenish glaze.

Outcurled, superimposed double jar rims on vertical jar necks, with Parthian-green glaze.

Thickened jar rims with wide, pronounced grooves on exterior and upper surfaces. This rim form normally occurs in association with double-rope handles and on vertical buff ware jar necks that are decorated with groups of vertical incisions.

Punctate decoration, usually consisting of fine comb-tooth impressions in chevrons or intersecting patterns of shoulders of jars like those referred to immediately above. In many cases, comb-tooth impressions alternate with larger circular impressions possibly produced by bird bones or reeds. Comb-incised meander decoration also may be present.

High inflaring jar necks with thickened rims. Parthian-green glaze characteristically is applied to entire interior and upper exterior.

#### *Sasanian Period*

As I indicated earlier, we are on substantially better grounds in discussing Sasanian settlement patterns on the

basis of the findings of an archaeological survey than we are for most of the preceding periods. The intrinsic importance of the period—the maximum urban and agricultural expansion within the entire ancient record—was such that an especially systematic effort was justified. Moreover, the ubiquity of Sasanian remains, a corollary of that achievement, enormously simplified problems of recording on sites where other periods were frequently obscured by later debris.

Table 21 presents estimates of occupational areas for all sites whose occupation during the Sasanian period seems reasonably assured. Following the major listing by gradations of increasing size, additional site numbers in some cases are given in parentheses. This indicates a relatively higher level of uncertainty as to the size of the Sasanian occupation, not a greater doubt whether it was occupied at all. Generally the source of the uncertainty is that there was an apparently reduced Sasanian settlement on a Parthian or earlier site, but with the proportion of the reduction difficult to estimate because of the preponderance of debris of another period. In some cases it means instead that the settlement was dispersed over a number of semi-detached mounds, with some, but an ill-defined, corresponding reduction in population density. No size estimates are included in this table for sites at which a Sasanian occupation was regarded as “possible” or “probable” rather than fully confirmed.

The ceramic indicators used for the identification of Sasanian sites have received curiously little systematic attention, considering the crucial importance of the period. There have been only a handful of excavations, most of them of modest scale and duration, even though in many areas an almost overwhelming array of dense surface material has long seemed to demand more careful scrutiny. A further difficulty is that much of what attention has been given to the period has been in a tradition of art history, concerned primarily with exceptional specimens and refinements of style. Mass-produced utilitarian wares have received virtually no study, although, since they alone occur in sufficient quantities, they are much more likely to be useful for surface dating. Primary reliance in this study has therefore been placed on two recent but quite limited undertakings that directly articulate with survey needs and objectives: stratigraphic soundings in 1969 at Tell Abu Sarifa that were explicitly intended to elicit a sequence (Adams 1970), and architectural surveys and soundings undertaken by the Deutsche Archäologische Institut in 1973 and 1975 at a number of Sasanian and Early Islamic sites situated primarily along the desert fringes of settlement west of the Euphrates (Finster and Schmidt 1976). References to earlier work, as well as some comparisons to relevant findings in a geographically much more inclusive region, will be found in these two publications.

Two problems with these accounts are worth men-

tioning, apart from the admittedly limited amounts of material on which they are based. The first is that both deal largely if not exclusively with excavated samples that derive from the later part of the Sasanian period. The late Parthian–early Sasanian transition accordingly is still very imperfectly understood, and little can yet be said of stylistic changes within the period that would permit us to identify occupational subperiods from surface collections.

The second problem concerns the Sasanian–Early Islamic transition. In this case there is now a reasonable and fairly consistent series of archaeological samples to work with, but their precise relationship to the epochal events of the Muslim conquest of Iraq is not yet clearly established. In other words, the known typological sequence remains very loosely attached to absolute chronology; features currently defined as largely Sasanian may have considerable extensions into the Early Islamic period—or vice versa.

In any case, the abruptness of the political shift appears to have had no counterpart in ceramic wares. As one authority has observed, “There is always an uncomfortable silence when Umayyad pottery, the earliest possible Islamic pottery is mentioned. On the whole, the first 100 years of Muslim rule have so far not yielded much in the way of strikingly new ceramic material and the general feeling is that pre-Islamic local productions were continued without any dramatic technical discoveries” (Crowe, 1977, p. 264). This conclusion is derived mainly from the study of glazed wares, which presumably were traded over greater distances, since they were more expensive to produce. So-called alkaline glazing was the standard of the time, ranging from a grayish white to a deep blue based upon varying admixtures of copper oxides. The common impression that such surface treatment was “the normal practice for every day bowls and jars” (Crowe 1977, p. 265) arises from the selective approach characteristic of Near Eastern archaeology for the later periods and is completely out of touch with the prevailing consumption patterns of the vast majority of the population. Still, the same generalization applies to the much more common, utilitarian, unglazed types. Older vessel forms and modes of surface treatment in the main merely continued with progressive modifications, gradually supplemented by newer ones reflecting an increasing predilection—though, at least at Abu Sarifa, never reaching even the 10 percent level (Adams 1970, table 2)—for glazed wares. Faced with a poorly anchored, prevailingly gradual transition of this kind, we must bear in mind that attempts to distinguish between terminal Sasanian and Early Islamic surface collections are to some extent arbitrary.

Finster and Schmidt provide a good working definition of the surface aspect of Sasanian sites, recognizable upon even very brief and casual inspection: “‘Spitzfusstöpfe,’ Fingerdruckmuster, Kerbmuster, undekorierte Scherben

TABLE 21 Estimated Occupational Areas in Hectares of Sasanian Sites

Area	Site No.	Area	Site No.	Area	Site No.
0.1	849 1115 1153 1593	4.1	1028	13.5	589
.2	636 716 735 872 909 973 1243 1507 (245 329 573 675 803 1393)	4.2	601 853 1014 1058 1095 1470	13.6	225
.3	182 992 1053 1294	4.3	859 1085	14.0	1417
.4	545 1012 1040 1344 1375 1492 1567 1577 1580 1617 1637	4.4	1457	15.0	090
.5	684 774 821 1092 1586 (131 149 585 666 738 1197 1206 1311 1410 1430 1572 1583)	4.5	141 501 703 759 904 988 1047 1138 1326	15.8	1569
.6	125 505 522 547 659 660 751 772 800 919 1029 1094 1228 1394 1416 1496 1497 1539 1561 1578 1616	4.6	180 906	16.0	002 037 1101
.7	918 1514 1613 1636	4.8	591 1110 1117 1183 1220 1226 1343 1378 1548		1120 1214
.8	523 641 723 767 779 843 864 915 1018 1033 1041 1052 1060 1062 1173 1275 1302 1453 1573 (1011 1083)	4.9	559 791 1036		(1229 1280)
.9	903	5.0	019 192 682 719 1209 1316 1374 1441 (519 534 639 764)	16.6	072
1.0	122 223 569 646 732 833 840 862 938 1190 1192 1285 1296 1493 (520 535 600 740 871 1066 1082 1113 1174 1386 1570)	5.2	052 905 1258 1465 1582	17.0	709
1.1	651 962 1288 1545	5.4	085 809	17.1	056
1.2	195 530 609 650 834 839 1048 1136 1151 1494 1611	5.5	925 1530	17.5	510 1432
1.3	432 550 754 788 923 1202 1444 1485 1536	5.6	1286 1595	18.0	1079 1495 1537
1.4	008 241 562 664 733 1106 1119 1335 1374 1502 1510 1524 1568 1618	5.8	607 990 1131 1200	18.2	614
1.5	250 652 655 771 922 1132 1224 1398 (647)	5.9	1065	18.9	842
1.6	014 978 1147 1155 1207 1281	6.0	138 913 1148 1189 (711 730)	19.0	1549
1.7	608 866 1122 1140 1221 1223 1255 1260 1566	6.2	062 093 121 571 581 1241 1415 1565 1629	20.0	(213)
1.8	015 619 661 851 1624	6.3	863 926 1289	20.2	847
1.9	159 560 565 612 1191 1201 1212 1443	6.5	598 1203	20.3	503
2.0	043 518 543 570 672 755 814 816 825 910 934 966 1097 1104 1167 1182 1204 1328 1397 1428 (665 A261)	6.6	554 617 1227 1532	21.0	045
2.1	799 1016	6.7	1141	22.2	031
2.2	577 708 857 890 965 1150 1225 1246 1334 1381 1524 1588 1603	6.8	948 1087	23.2	082
2.3	1527	7.0	035 088 214 381 599 704 1013 1435 1518 (512)	23.8	1436
2.4	202 645 690 725 927 1234 1263 1300 1382 1472 1559	7.2	094	24.0	134
2.5	058 222 588 654 663 701 860 868 942 1187	7.3	1426	25.0	055 532
2.6	568 674 789 876 1073 1126 1176 1186 1195 1279 1297 1356 1395 1541 1544 1581 1614 1621 1633 A264	7.5	1057 1242 1468 1627 A221 (983)	26.2	1213
2.7	089 969 1068 1238	7.6	217 1184	27.0	604 798 (582)
2.8	596 638 1076 1427	7.7	099 1107	27.2	882
2.9	091 823 1254 1298 1380 1384 1596	7.8	558 613 696 1026 1080 1533	28.0	699
3.0	544 594 717 929 1252 1422 1433	8.0	238 595 845 1631	28.8	(621)
3.1	533 838 941 1556	8.1	1121 1487	29.5	030
3.2	513 525 616 637 643 683 698 873 902 955 957 984 986 1133 1142 1277 1402 1519 1525 1535 1619 1623	8.5	1210	30.0	(265 NIPPUR)
3.3	778	8.6	985	32.0	063
3.4	059 908 916 1093 1125 1266 1620	8.7	1265	34.5	1534
3.5	653 681 687 743 780 1216 1622	9.0	036 065 079 098 511 1039 1274 1314	35.0	549
3.6	171 526 540 963 989 1128 1222 1557 1632	9.2	566	45.0	(URUK)
3.7	038 726 1078 1149 1268 1313	9.3	1144 1287	46.5	592
3.8	096 194 728 763 1010 1521	9.8	200	49.0	1273
3.9	456 762 968	9.9	1404	50.0	1193
4.0	017 184 597 846 874 911 1084 1239 1292 1352 1408 1523 1543 (625)	10.0	1424 1560 (064)	52.2	183
			Area Site No.	54.0	452
		10.2	924 1185	54.2	1310
		10.9	229 1116	58.0	092
		11.0	(603)	70.0	196
		11.1	1146	72.0	656
		11.2	668 1262	160	700
		12.0	768 914 946 (676 1529)	230	004
			1135		

*Note:* Areas of site numbers given in parentheses can be estimated only with a relatively high level of uncertainty. Generally this means either an apparently reduced Sasanian settlement on a Parthian or earlier site but with the proportion of reduction difficult to estimate, or a settlement dispersed over a number of semidetached mounds with at least some corresponding reduction in density. No size estimates are included here for sites at which a Sasanian occupation was regarded as “possible” or “probable” rather than fully confirmed.

mit blauer Glasur" (1976, p. 168). This summary can be more fully specified for analytical purposes as follows:

Very large storage jars with incurving, thickened rims and a characteristic base that has been variously described as a "Spitzfuss" and a "torpedo-fuse point." Rough reddish ware, generally with an unoxidized black core; the interior is sometimes partly coated with bitumen. Sasanian examples tend to be almost cylindrical in shape and a meter or more in length, and they frequently have a notched, applied ridge below the rim (Adams 1970, p. 100, fig. 6ce).

A variety of large flaring plain bowls with accented, sharply profiled rims and generally flat bottoms. Greatly enlarged club-headed and ledge rims are common, often embellished with scalloped ridges either on their upper surfaces or immediately underneath (Adams 1970, p. 99, fig. 6av-ax, bg-bj; Wenke 1975-76, fig. 7:227).

Small, plain buff or reddish stoppers or bowls with flat bottoms and everted upper sides, occasionally with pull-knobs centered on the bottom of the interior (Adams 1970, pp. 99-100, fig. 6bv, cc).

Rounded or flared thin buff ware bowls. Groups are not infrequently found inverted and whole, exposed by surface deflation. Their interiors often bear traces of Aramaic or Hebrew incantations, suggesting that they were deposited as part of a ritual. It may be of some ethnic or religious significance that their occurrence is apparently discontinuous even on large sites with essentially contemporary levels of occupation. Nippur, for example, has very large numbers; Zibiyat (site 700) has few or none. Other bowls that are similar in size and shape are decorated on the interior with incised multiple-meanders, perhaps comb impressions (Ricciardi 1967, figs. 132-33; Adams 1970, p. 99, fig. 6bu, 10al, an, 17).

"Honeycomb" surface decoration, applied primarily to large plain buff ware storage jars. In varying combinations this consists of broad bands of cellular impressions and trailed parallel channels, apparently impressed in a thick, wet slip with the fingertips or spatulas of some kind (Wenke 1975-76, fig. 12:277; Finster and Schmidt 1976, before firing (Adams 1970, p. 102, fig. 10aa-ac, ag-aj, 16j; pp. 92-93. Abb. 48a-c, Taf. 48a-c, e-g, 52-55, 58, 60-61). It was observed at Abu Sarifa that the earlier examples of this technique, putatively antedating the end of the Sasanian period by at least a century, were more geometric in arrangement and more carefully executed than the more numerous specimens in the succeeding level, and that the style of decoration then rapidly disappeared. It has more recently been pointed out (B. Finster, pers. comm.) that the earlier impressions also tend to be deeper, that the later ones can be summarily described as having a "degenerate" appearance in comparison with the former, and that this distinction is of considerable significance in ordering surface collections.

Other forms of surface treatment applied to large

areas include a variety of patterned effects that have been described as "riffing" and "pattern impressing" (Adams 1970, p. 102) and as "stichelartiges Ritzmuster" (Finster and Schmidt 1976, p. 92, Taf. 48d, 54b, 56, 61b).

Certain stamp impressions, principally applied to plain buff ware jar bodies, are of Sasanian date. Characteristically they "consist of curvilinear symbols or representational motifs within a non-circular field," but they are strikingly less common—and hence much less useful for dating in a surface reconnaissance—in south-central Iraq than in the Diyala region and other immediate hinterlands of the Sasanian capital at Ctesiphon (Adams 1970, p. 101).

Small, flaring, flat-based, or rarely low ring-based, cups or bowls with a slight carination just below rim, covered with a thin, whitish blue glaze over a yellowish, very friable paste (Ricciardi 1967, figs. 175-76; Adams 1970, p. 106).

Probably beginning in the Sasanian period but more characteristic of Islamic times is a deep blue all-over glaze. At least in later periods it occurs on large, deep, ring-based bowls as well as large two-handled jars, but reconstructable profiles of securely Sasanian date are not known in this region. Slight horizontal corrugations in the soft, flaky, yellowish fabric suggest that vessels may have been at least partly formed through a coiling process. Interiors, also glaze-covered, typically fire to a lighter blue or a dirty white (Adams 1970, pp. 106-7).

Finally, note should be taken of distinctively Sasanian baked bricks, common on all of the larger and many of the smaller sites. They are typically large (33-34 centimeters square, 7-8 centimeters in thickness), well and uniformly made, and reddish brown in color. Apparently they were relatively well fired, for they resist the effects of desert wind scour much better than their Islamic counterparts.

### Islamic Period

Remains of the Islamic period are more or less immediately recognizable from the varied and distinctive glazed wares associated with them, although it is quite possible that for the first century after the Arab conquest, or even somewhat longer, changes were introduced only gradually. Profuse accumulations of baked bricks are another characteristic feature, and fragments of glass seem considerably more numerous than they had been earlier. However, these obvious features provide little assistance in refining the chronology of a site within the Islamic period. Necessary as internal chronological subdivisions are for our purposes, the reader should be warned that there is no wide consensus on them.

The Islamic sites recorded during the survey are tabulated in table 22, on the basis of temporal subdivisions that I will outline presently. Size categories are indicated, instead of measured areas. There is little to prevent the use of a more accurate, measured standard for the Middle

TABLE 22 Islamic Sites: Size Categories and Periods of Occupation

No.	E M L	No.	E M L	No.	E M L	No.	E M L	No.	E M L	No.	E M L	No.	E M L	No.	E M L
002	3 - -	538	- 1 1	653	1 - 1	808	1* - -	955	1 (1) -	1117	2 - -	1238	1 - -	1369	- - 2
004	2 - -	540	1 1 -	656	1 (1) -	810	- - 1	957	1 - -	1119	1 - -	1239	1 - -	1370	- - 2
006	- 1 -	541	3 3 3	657	- - 1	811	1* - -	963	1 - -	1120	3 - -	1241	(1) - -	1374	1 - -
011	- - (1)	558	2 - -	658	- - 1	813	1* 1 -	968	1 - -	1121	2 - -	1242	(1) - -	1387	- - 1
036	1 - -	559	2 - -	660	1 (1) -	814	1 - -	969	1 - -	1122	1 - -	1243	1 - -	1388	- - 1
052	2* - -	560	1 - -	662	- - 1	819	1*(1) -	974	- - 1	1125	1 - -	1246	1 - -	1391	- - 1
059	(1) - -	564	- 1 1	670	2*(1) -	821	1 - -	986	1 - -	1132	1 - -	1252	(1) - -	1393	- - 1
062	1 - -	567	- - 1	674	1 - -	823	1 - -	992	(1) - -	1133	1 - -	1255	1 - -	1395	- - 1
063	2 - -	571	- - 1	681	1 - -	838	1 - -	998	- - 1	1135	3 - -	1258	2 - -	1396	- - 1
064	(1) - -	572	- - 1	682	2 2 2	839	1 - -	1002	- - 1	1139	2 - -	1259	(1) - -	1402	1 - -
065	2 - -	575	- 1 1	683	1* - -	843	1 - -	1004	- - 1	1140	1 - -	1260	1 - -	1406	2 - -
085	2* - -	577	1 - -	686	1 - -	847	4 - -	1013	2* - -	1141	2 - -	1262	3 - -	1408	1 - -
092	3 - -	578	- 1 1	687	1 - -	848	4* - -	1014	2* - -	1142	(1) - -	1265	2 - -	1409	2 - -
094	2 - -	582	4 - -	697	- - 2	849	1 - -	1015	2* - -	1144	2 - -	1266	1 - -	1415	2 - -
096	1 - -	583	- 1 1	700	2 1 1	850	1 - -	1016	1 - -	1146	3 - -	1268	1 - -	1417	3 - -
099	2 - -	587	1 (1) -	701	1 - -	851	(1) - -	1017	1 (1) -	1147	(1) - -	1273	5 - -	1422	1 - -
116	- (1) -	589	1 - -	702	1 1 1	852	1* - -	1022	1 - -	1148	2 - -	1274	2 - -	1424	2 - -
125	1 - -	591	2 - -	707	1* - -	853	2* - -	1023	1* - -	1149	1 - -	1275	1 - -	1427	1 - -
131	1 - -	592	5 - -	708	1* - -	855	1 - -	1026	2* - -	1150	1 - -	1276	3 - -	1432	3 - -
138	1 - -	593	- - 2	709	3 - -	856	1* - -	1028	1 - -	1155	1 - -	1277	(1) - -	1435	1* - -
182	(1) - -	594	1 - -	710	1* - -	859	2*(2) -	1030	2 - -	1173	1 - -	1279	1 - -	1436	4 - -
188	- - 1	595	2 - -	712	1 1 1	862	1 - -	1031	1 - -	1174	1 - -	1280	3 - -	1441	(1) - -
194	1 - -	598	2 - -	717	1 - -	863	2 - -	1035	1 (1) -	1176	1 - -	1281	1 - -	1444	(1) - -
195	1 - -	599	1 - -	719	2 2 2	868	1 - -	1036	2 - -	1182	1 - -	1285	1 - -	1453	(1) - -
200	2 - -	600	1 - -	725	1 - -	873	1 - -	1038	1 - -	1183	2 - -	1286	2 - -	1465	(1) - -
214	2 - -	601	2 - -	726	1 1 -	874	1 - -	1039	1 - -	1184	(1) - -	1287	2 - -	1468	2 (1) -
217	2 - -	603	3 - -	728	(1) - -	878	(1)(1)(1)	1042	2 - -	1185	3* - -	1288	1 - -	1470	(1) - -
221	1 - -	604	2 - -	729	1 - -	879	(1)(1)(1)	1043	1 (1) -	1186	1 - -	1289	2 - -	1472	(1) - -
238	2 - -	605	3 - -	742	2 (2) -	881	(1)(1)(1)	1045	1 - -	1187	1 - -	1296	(1) - -	1474	- - (4)
501	2 - -	607	1 - -	750	- 2 -	885	(1)(1)(1)	1047	1 - -	1189	2 - -	1298	(1) - -	1475	(1)(1)(1)
502	- 1 1	608	1 - -	752	- 1 -	886	(1)(1)(1)	1051	1 - -	1191	1 - -	1300	(1) - -	1478	(1)(1)(1)
503	4 - -	609	1 - -	756	2 - -	888	(1)(1)(1)	1052	1 - -	1193	(2) - -	1302	(1) - -	1481	(1)(1)(1)
504	- 2 2	610	1 (1) -	757	2*(2) -	890	1 - -	1053	1 - -	1194	1 - -	1310	5 (2) -	1483	(1)(1)(1)
505	(1) - -	611	1 - -	760	4* - -	892	- - 1	1058	1 - -	1195	(1) - -	1313	1 - -	1487	(1) - -
506	- - 1	612	1 - -	763	1 - -	893	(1)(1)(1)	1061	1 (1) -	1197	1 - -	1314	(1) - -	1494	(1) - -
507	- - 1	614	3 - -	767	1 - -	900	(1)(1)(1)	1063	1 - -	1202	1 - -	1316	2 - -	1504	2 - -
508	3 3 3	617	2 - -	769	1* - 1	903	1* - -	1066	1 - -	1203	2 - -	1319	- - 1	1505	- - 2
509	- - 2	619	1 - -	773	1 - -	905	2* - -	1068	1 - -	1204	1 - -	1327	- - 1	1506	- - 2
510	1 - -	621	2 - -	774	1 - -	906	- - 1	1078	1 - -	1210	2 - -	1328	(1) - -	1507	1 - 1
511	2 - -	622	- - 2	775	1* - -	910	1 - -	1079	2 - -	1212	(1) - -	1329	- - 2	1521	(1) - -
512	2 - -	624	- - 2	777	1 - -	911	1* - -	1080	2 - -	1213	4 - -	1330	- - 2	1525	(1) - -
513	(1) - -	626	- 3 3	778	1 - 1	915	1 - -	1084	1 - -	1214	(2) - -	1334	(1) - -	1532	2 - -
518	1 1 -	630	(1)(1)(1)	779	1 - -	916	1* - -	1085	(1) - -	1216	1 - -	1336	(1)(1)(1)	1533	2 - -
519	1 - -	633	(1)(1)(1)	780	1 - -	918	(1) - -	1087	2 - -	1220	(1) - -	1338	- - 1	1534	(2) - -
520	2 2 2	634	(1)(1)(1)	782	1* - -	919	(1) - -	1092	1 - -	1221	1 - -	1352	1 - -	1536	(1) - -
521	2* - -	640	3* 1 1	783	1 - -	920	(1)(1)(1)	1093	1 - -	1222	1* - -	1360	- 1 1	1546	(1)(1)(1)
523	1 - -	644	2 2 -	784	- - 1	922	1* - -	1097	1 - -	1223	(1) - -	1361	- 2 2	1555	(1) - -
524	- 1 1	645	1* - -	785	- - 1	923	1 - -	1101	3 - -	1224	(1) - -	1362	- 1 1	1556	(1) - -
527	1 1 1	646	1 - -	788	(1) - -	924	3 - -	1104	1 - -	1225	(1) - -	1363	- 2 2	1559	1 - -
530	1 1 -	648	- 1 1	790	(1) - -	925	1 - -	1106	1 - -	1226	(1) - 1	1364	- - 1	1585	(1) - -
534	2 2 2	649	- 1 -	796	2* - -	938	1 - -	1107	2 - -	1227	(1) - -	1366	- - 1	A259	- 1 -
536	1 1 1	651	(1) - -	798	2 - -	940	(1) - -	1111	1 - -	1228	(1) - -	1367	- - 2	A261	3 3 3
537	1 1 1	652	1 - -	803	- - 1	949	- - 1	1116	3 - -	1229	(1) - -	1368	- - 3	Nippur	5 - -

and Late phases, but it will be immediately observed that by these later phases there was little significant settlement in the region left to record. For the Early Islamic period the difficulty is that the gradualness of the transition from Sasanian times, as well as continuing debate over how it should be recognized, makes a distinction between Sasanian and Early Islamic occupational areas very uncertain. To list estimated areas of occupation individually would, in these circumstances, tend to endow them with an air of precision that is probably not justified.

Difficulties in distinguishing Early Islamic collections from Late Sasanian ones are responsible for a substantial number of cases in which a site can be given that dating only provisionally. In these cases table 22 includes a considerably more doubtful estimate of its size category in parentheses. Also in parentheses in the Early Islamic column are sites on which the only available information is taken from the files of the Directorate General of Antiquities (see above, p. 216). Although these were recorded only under the designation "Islamic," the distribution by periods of more adequately recorded sites makes it extremely likely that the great majority of them were occupied primarily if not exclusively during the Early Islamic period. Information on size is not included in the official records, and some of them are doubtless larger than the lowest category (0.1–4 hectares) that has uniformly been attributed to them. Taking all these circumstances into account, sites that are parenthetically listed cannot be ignored on the grounds of somewhat doubtful attribution. Such sites were not considered in analyzing the urban hierarchy and extent of settlement for the Sasanian period, but there is probably less distortion in comparing Early Islamic with Sasanian remains if in this case they are taken fully into account.

Some size estimates are also enclosed in parentheses in the Middle and Late Islamic columns of the table. Where such a listing is provided in all three columns, it indicates that the site was not visited during the survey and is known only from the directorate's files. Where it is confined to the Middle and Late Islamic columns, it suggests, in most cases, a relatively small terminal occupation during these periods. Sometimes it may also refer to an apparent discrepancy between the dating implied by the observed surface pottery and other, less reliable evidence (e.g., brick size), or an estimate based on the known historical importance of a town whose ruins were not visited (e.g., site 1474). Details on these individual cases will be found in the site catalog given in chapter 7.

Turning to the dating criteria themselves, many aspects of the discussion of the Sasanian period are equally applicable to its sequel. There has been an identical lack of attention to the more mundane aspects of ceramic production, and especially to the unglazed utilitarian wares that at all times heavily preponderated. Hence the ceramic sequences on which a surface reconnaissance must depend

in order to assign dates of occupation to individual sites are still inadequately developed. Moreover, wide disparities exist between the absolute dates assigned to the floruit of different styles by authorities working on different aspects of the problem, with a general lack of the kinds of unequivocal, stratigraphically secure evidence that would allow a resolution of existing differences.

For this discussion, therefore, the Early Islamic period is a somewhat indefinitely bounded span of time. Ambiguities as to its inception have been adumbrated in the preceding section; comparable or even greater ambiguities attend its transition to the succeeding period. It is defined primarily by a set of characteristics, many of them of undisputed Early Islamic age if a precise specification of the chronological meaning of this term is avoided, that have been fairly uniformly observed to constitute the dominant surface component on several hundred sites in south central Iraq. These ceramic stylistic features apparently signify the terminal occupation in such cases, marking a time of very widespread, and to a large degree final, abandonment of the region.

It is likely, though by no means certain, that this abandonment was under way by or soon after the mid-ninth century A.D. One of the numerous large sites whose terminal surface materials are of this generally Early Islamic character is the much more ancient city of Nippur, the name preserved in Arabic as Niffar and known as the ruin of a famous place as late as the time of Yaqut in the thirteenth century. Islamic coins have been found in quantities on the surface of the mound by excavators who have worked there for many seasons, and all that can be identified antedate the end of the eighth century (McG. Gibson, pers. comm.). Similarly suggestive of a massive decline of the region at about this time is the absence of reference to it in the works of the great geographers of the later ninth century, which would be inexplicable if Nippur and its contemporaries had continued to flourish. On the other hand, bishops of Nippur continued to be appointed until the late tenth century, at which time the title was joined with that of the later city of Nil 50 kilometers northwest. If the coins and geographers are to be believed, therefore, one must suppose that because of its antiquity and former importance the title may have been retained for a time even after the seat of dominical authority was transferred. Such a possibility is at least not inconsistent with the employment of "archeologismes" in connection with bishoprics of the time (Fiey 1968, pp. 250–51).

Supporting a ninth century dating is the list of weirs mentioned on p. 216. Compiled at the end of the ninth century and including some entries that had already been abandoned at that time, it contains no listing for the Nahr al-Nars, nor any other that could conceivably stand for the weir that clearly existed at site 1213 (cf. above, p. 213). The surface ceramics on the lengthy ruins adjoining both

sides of the main canal above the weir are essentially those noted as "Early Islamic" throughout the region, indistinguishable from those at Nippur. It seems very likely that the weir, the canal, and also the adjoining site must have been abandoned for a considerable period before the list of weirs was compiled, in order not to be included in it.

As an alternative, however, it is not impossible that the religious titulary should be given greater weight and the time span of the Early Islamic surface materials continued well into the tenth, and conceivably even eleventh, century. A minor but unmistakable component of those materials is the use of underglaze sgraffiato drawings, and some Islamic archaeologists currently maintain that these "were not applied to slip ware in the Middle East much before the end of the 10th century" (Schnyder 1974, p. 90; cf. Naumann and Huff 1975, p. 190).

In one sense this difference is only marginally relevant for the purpose immediately at hand. A set of widely recurring dating criteria is not less valid, after all, if it spans four centuries than if it is largely limited to a two-century period. But, in another sense, what is at stake is a framework not only for comparative dating but for understanding of profound change in settlement and demography, a framework that applies to succeeding periods as well as to this one. Hence some discussion of ceramic dating problems is necessary here, although it must be conjoined with the broader, interpretive discussion in the foregoing chapter.

The Abu Sarifa excavations were undertaken to help clarify these problems, and the sequence given here is broadly consistent with the sequence of stratigraphic superimposition at that site. But it cannot be maintained that those limited soundings provide decisive support on any of the crucial issues. Discussions of dating still involve the glazed pottery almost exclusively, and the quantities of glazed pottery found were altogether inadequate to establish the relative position and internal dynamics of change of any particular type. Adding considerably to the uncertainty, moreover, was the extensive disturbance of the site in Islamic times, caused by deep pits in which trash subsequently accumulated. Where individual fragments of a single glazed vessel of a key type are found distributed over at least 1.25 meters of vertical depth, some hesitancy must be expressed about assigning its provenience to any level. Similarly, the penetration of a handful of Early Islamic glazed ware types into what seems conclusively a level mainly occupied during the Sasanian period suggests that the Abu Sarifa evidence adds little to our knowledge of the fine-grained temporal distribution of those types (Adams 1970, p. 91, table 2, fig. 14).

In fact, however, little is known of temporal distributions on any basis. A series of entirely new glazed styles spread over much of central and southern Iraq, at some ill-defined period or series of periods after the new Arab

conquest. The absence of these styles in level III at Susa (Rosen-Ayalon 1974, pp. 207, 233, 251, 261, 276) and at a site like Tulul al-Ukhayder, apparently abandoned only about the middle of the eighth century (Finster and Schmidt 1976, p. 113), argues that most of them were introduced during the second century following the conquest rather than earlier. If so, the uncertainties about Abu Sarifa multiply. Level IV there, considered Early Islamic, contains more than sixty sherds of these new types (Adams 1970, table 2). Is this merely a further indication of the distortions introduced by extensive pitting, or should the date of primary construction in the level be raised from the mid-seventh to the mid-eighth century?

Prominent among the new styles, and of crucial importance for dating, are wares with splashed underglaze decoration in green, amber, and manganese-brown or -purple. The putative source of the style, certainly very similar in appearance and differing mainly in the absence of manganese as a tint, lay in T'ang Chinese *sans-ts'ai* vessels of a type not made after about the middle of the eighth century (Watson 1970, p. 37). Following Fehérvári, "it is tempting to argue that this type of pottery was introduced . . . at or soon after the middle of the eighth century," perhaps by Chinese prisoners (1973, p. 36). But actual imports are not known. Moreover, the Chinese prototypes are known only as imperial funerary ceramics, "not the kind of ceramic ware which would have appeared in the bazaar at any time, least of all, be exported to the other end of the Asian continent" (Crowe 1977, p. 270).

A related type of *san-ts'ai* ware reappeared in north China during the Liao dynasty (A.D. 918–1126), and a few unquestionable examples of this have been identified at several widely separated Islamic sites that hint at its importation by sea. This is entirely too late to account for the origin of all Middle Eastern splash-glazed wares, but, as Basil Gray observes, we are not thereby compelled to opt for the mid-eighth century alternative. Questioning the present completeness of the Chinese evidence, he has suggested that continuity in the production of the ware between T'ang and Liao will yet be found. If so, the process of borrowing could have extended over a long interval. The celebrated gift of Chinese ceramics from the governor of Khurasan to Harun al-Rashid in 804, including twenty pieces of porcelain and two thousand of other varieties, may well have been an incident of some importance in this process of commercial or ceremonial transfer followed by local imitation (Gray 1977, pp. 232–33).

In any case, splash-decorated glazed wares, including those additionally decorated with underglaze incisions in script and floral motifs, were present at Hira in contexts ascribed to the later eighth century on numismatic grounds (Rice 1934, pp. 54, 70). They not only begin but probably reach their highest level of popularity in level II at Susa, coinciding with the later eighth and ninth centuries



(Rosen-Ayalon 1974, p. 261). Because of their prominence among the finds at Samarra, it has similarly been taken largely for granted that splash glazes and sgraffiato were in full use, if not necessarily at the height of their popularity, by the mid-ninth century A.D. To be sure, the character of publication of the finds at Samarra does not permit them to be directly associated with the relatively brief period of its use as the 'Abbasid capital (A.D. 835-93). But all the published pottery from the original program of excavations is at least reported to derive from the palaces and public buildings that were the main objectives of the excavations and that certainly were occupied during the floruit of the city (Sarre 1925, p. v). The unstable, centralized, oligarchic character of the government of the time makes it seem rather unlikely that these would have received substantial, continuing use after the seat of power was returned to Baghdad. On the other hand, nothing associates the disappearance of the style with the abandonment of Samarra as the imperial capital; the town continues today, after all, as a local administrative, market, and pilgrimage center. Moreover, a jar in a variant of the splash-glaze style for which there are a few parallels at Samarra, securely dated by the hoard of coins it contained, was still in use at Susa in the mid-tenth century (Fehérvári 1973, p. 36).

All these disparate considerations cannot be fully reconciled. It must be acknowledged that date provisionally assigned to the Early Islamic sites recorded in this survey may need modification when Islamic archaeology finally receives the concerted scientific attention that is its due. But it does seem reasonable to conclude that both the "Early" and the "Classic" Samarran sgraffiato styles were at least partly contemporary with the floruit of Samarra as a capital. Where the former of these styles occurs on smaller sites in south-central Iraq, therefore, it is regarded in this study as signifying a late eighth or ninth century occupation. The latter also seems to have come into use not long after the mid-ninth century, but it is assumed here to have continued through the tenth century and probably for some time into the eleventh.

Thus it is very likely that the presence of the "Classic" sgraffiato style on a site is an indication that it was occupied until a significantly later date than other sites with a generally similar, Early Islamic pottery conspectus. For this reason sites where the style was observed have been indicated in table 22 with an asterisk.

Emphasizing once more the essential fuzziness of our knowledge of the ceramic indicators, those that have been employed in this study for the Early Islamic period are as follows:

Large, plain buff ware jars continue in a Sasanian or even earlier tradition, although they become proportionately less numerous. Hole-mouthed, "torpedo-fuse base" forms are among them, but somewhat more common are globular forms with three handles attached to prominent,

high vertical collars that are decorated with multiple horizontal grooves.

Also continuing an earlier tradition are large plain buff ware bowls with flat bottoms and flaring sides. The earlier emphasis on decorated flange rims and club-headed rims disappears, but a few examples with moderately bolstered rims may preserve a remnant of that style (Adams 1970, fig. 6*j-o*).

Newly introduced, perhaps only in the mid-eighth century, coinciding with the onset of level II at Susa (Rosen-Ayalon 1974, p. 50, appendix II), are relatively small jars of a notably thin, well-levigated, seemingly temperless, light buff fabric. Most are given individuality by having been wheel-modeled to produce multiple horizontal contour breaks, grooving, or both. Incised decoration is often applied to these vessels, in the form of cross-hatching, meanders crosscut by slashes, and leaf and twining plant motifs that are often arranged in vertical panels (Adams 1970, fig. 6*a-i*, *p-w*, *ac-af*, *ai-as*, fig. 10*a-x*; Rice 1934, fig. 20). Again to judge from Susa, however, most of these types of surface decoration were introduced somewhat earlier (level III) on jars of less stylized form (Rosen-Ayalon 1974, figs. 39-40, 53-54).

Knobs, or stamped or otherwise embellished "turbans," added to the upper surfaces of large jar handles (Adams 1970, figs. 7*c*, 8).

Impressed stamps, generally "bull's-eye" or other geometric patterns within a circular field, commonly applied in one or more horizontal rows to bodies of large plain ware jars (Adams 1970, fig. 9; Finster and Schmidt 1976, Abb. 49; Rice 1934, fig. 22; Rosen-Ayalon 1974, figs. 138-39, 141-43).

Handmade, crudely shaped jars, stoppers, and especially flat-bottomed basins with large volcanic grits and other irregularly shaped tempering materials, including small fragments of glazed sherds. Often pinkish in color, this locally fabricated and only semiportable ware is often fire-blackened and perhaps burnished on the interior (Adams 1970, p. 95, fig. 5*a-f*).

Dark-faced orange pottery, a hard, thin, somewhat brittle ware used in the manufacture of presumably imported profiled bowls and jars that were widely diffused in small quantities. Fluted strap handles are common and occasional sherds bear impressed rouletted chevron decorations (Adams 1970, p. 96, fig. 5*i*; Finster and Schmidt 1976, p. 111, Abb. 45, Taf. 50*a, b, d, f*).

Black steatite bowls or basins also were imported. The characteristic shape was flat-bottomed and vertical-sided, often equipped with horizontal lug handles (Adams 1970, p. 96).

Turning to glazed wares, by all odds the most common is a deep blue or blue green all-over glaze on a soft yellowish fabric. It is already referred to above at the end of the Sasanian section, although the period of its greatest popularity was clearly later—at Susa, in fact, only after the



mid-eighth century (Rosen-Ayalon 1974, pp. 162–64). The most common form is a large, ring-based, two-handled (strap or lug) jar that is sometimes decorated with underglaze meanders and other forms of incised decoration; applied medallions and low indented ridges were popular on vessels of this type in the Diyala region but are very rare here (Rice 1934, p. 70, fig. 23; Adams 1970, pp. 106–7, fig. 7d; Finster and Schmidt 1976, pp. 111–12, Abb. 46).

Small, white-glazed bowls with a low ring base, occasionally with widely spaced vertical fluting, are also relatively common. The surface finish is usually described as a tin opacified lead glaze, but recent research has cast doubt on at least the uniform applicability of this description. Complicating the problems of chronological assignment, apparently there was instead a long, fairly complex transition, in which the Early Islamic products of this type still were mainly produced in the Sasanian, underfired alkaline glazing tradition (Crowe 1977, p. 266). A soft yellowish fabric is sometimes but not always used for this long-lived category. Some individual examples appear to be local imitations of Chinese celadon, but the type itself may well antedate the introduction of celadon and hence may be misleadingly described if referred to as merely “imitation” celadon (Sarre 1925, Taf. 23–25; Rice 1934, p. 69; Adams 1970, p. 110, fig. 11aa).

Next in importance, though pronouncedly rare, are wares with splash decoration beneath a transparent glaze, occasionally miniature vessels but predominantly large, deep ring-based plates in putative imitation of T’ang patterns. Two styles were recognized in the fieldwork accompanying this study, an “Early” one believed to slightly antedate the Samarran period (although continuing through it) and a “Classic” one also much in evidence at Samarra but probably continuing for more than a century afterward. A partial succession of this kind, combined with a considerable degree of overlap for the two styles, is at any rate strongly suggested by Reitlinger’s work near Kish. He found that something very like the “Early” style as described here had essentially ceased to be produced, while the “Classic” style remained in use, at the time of a reoccupation dated to the late tenth or early eleventh century (1935, p. 201). Sgraffiato underglaze decorations incised through the slip may occur on both but are more common on the latter.

The “Early” style occurs on fabric that varies from grayish buff, fairly low-fired, to finer examples made of a hard, reddish, sandy clay. Long radiating splashes form dense, all-over patterns in green, manganese (violet), brown, orange, or a combination, over an orange yellow or white slip. Incised patterns, when they occur, are executed in a uniformly fine, often barely visible, line and include horizontal bands, loose scrolls, and thin, unconnected, nonrepresentational motifs. It is the splashes of color that clearly dominate the ensemble (Lane 1947, pl.

6B; Sarre 1925, pp. 76–77, Taf. 32:4; Adams 1970, pp. 108–9).

The “Classic” style is executed on vessels of the same shape, although hard-fired examples are perhaps less common and some cases of inferior workmanship are encountered. The long splashes of color are reduced to sparse mottling, mainly isolated rows or small groups of brown dots, or small daubs and rare splashes of green, on a white slip. Incised decorations become denser, more diverse, more suggestive of written characters and other representational motifs, more painstakingly executed, and increasingly dependent for their effect upon wide variations in the width of the line or pattern cut through the slip to expose the underlying color of the fabric. It is these incised decorations rather than the daubs of color that are the primary focus of attention (Sarre 1925, Abb. 161, 165, 168–70; Adams 1965, p. 109).

Related to the “Early” style of splash-decorated ware are vessels of the same shape and fabric that receive all-over green underglaze coloring. Examples occur with underglaze incisions in the same patterns (Adams 1970, fig. 11v).

Rarely occurring, although fairly common in other parts of the Mesopotamian plain, are flaring, slightly rounded bowls with radiating patterns of long blue-glaze and/or manganese violet-glaze splashes, over a white-glazed field on the interior surface (Adams 1970, p. 110).

Finally, there are small, thin, uniformly well made bowls of “luster” ware affinity, with mainly olive-colored geometric underglaze designs painted on white or gray backgrounds (Adams 1970, pp. 110–11; cf. Rice 1934, p. 70).

Early Islamic bricks in many cases seem to resemble those of the Sasanian period. They are smaller (typically 29–30 centimeters square) but are almost equally well fired and tend to the same deep, red brown color. A further reduction in size continues, perhaps still within the Early Islamic period. It is possible, for example, that the Sasanian–Early Islamic tradition of large, well-made bricks was intended largely or exclusively for public buildings. As the use of bricks in private dwellings rapidly spread, a different, much less well made type of brick might have come into existence that for a time supplemented but did not replace the earlier one. At present this is admittedly speculative. All that is certain is that within four or five centuries the only bricks still being made were small (21–23 centimeters square), poorly shaped, and of a soft, low-fired, yellowish fabric. But the use of brick size alone as an indication of dating within the Islamic period, which at one time seemed a promising lead (Adams 1965, p. 183), seems increasingly likely to obscure a complex, overlapping sequence. Note may be taken of the occurrence of 30-centimeter brick in the Islamic tower at Zibliyat (site 700), for which a radiocarbon determination now suggests a dating as late as the Samarran period.

The general comments that have preceded the Sasanian and Early Islamic periods apply with equal force to the Middle Islamic period. Most specialists' attention remains concentrated on the encompassing, paradigmatic stylistic expression, all too often deprived of archaeological context by the illicit manner of its acquisition. Little practical guidance on dating continues to be available, therefore, that is relevant to the masses of mundane pottery encountered during a surface reconnaissance. If the problem can be more briefly disposed of than in the former cases, it is largely because the size and number of settlements dwindled so precipitously that the problem of dating loses much of its significance.

The Middle Islamic period, for this study, is assumed to begin at about the end of the tenth century, or even somewhat later, and to continue until the profoundly changed conditions following the Mongol conquest in the mid-thirteenth century. Within this interval there is a further, easily recognized ceramic horizon, the advent of blue black painted underglaze designs, as well as a group of floral designs in blue or black. These styles appear together at Wasit at about the middle of the twelfth century (Safar 1945, pp. 41–42). Their very rare occurrences in this area, individually noted in the site catalog, reflect a reduction of settled life to apparently its lowest level since remote prehistoric times. Before that time and certainly after the Samarran period, however, a complex of traits occurred in the uppermost levels at Abu Sarifa (including a surface level that has apparently been wind-deflated) and elsewhere whose individual components seem for the most part to have persisted throughout the entire Middle Islamic span of perhaps three centuries. More comprehensively, the useful surface characteristics of the period may be described as follows:

Blue glaze continues as the dominant color, but fabric, form, and the glaze itself are radically altered. The soft yellowish paste is no longer employed, and in this respect the glazed and unglazed vessels now appear to form a continuum. Also discontinued is the characteristic two-handled, ring-based jar with all-over blue glaze that goes back to Early Islamic or even Sasanian times. Smaller jugs and especially deep ring-based bowls are the newly prevailing forms. Finally, surfaces have a coarser, sometimes mottled texture, and the glaze frequently has cracked away from the fabric. Bowl interiors are completely coated, and the glaze coating is carelessly applied to the upper exteriors as well.

Green and grayish white glazes also continue, but within the same framework of changes in composition and vessel form as those just identified for blue glaze. Considerably less common than blue, these colors may be reserved largely or even exclusively for bowls.

The sgraffiato tradition likewise continues, while apparently declining progressively in quality. Splashes or even isolated small flecks of color are frequently not in

evidence on fairly large sherds, and underglaze slip is irregularly applied and sometimes missing. Incised patterns are increasingly broad-line, crude in technique, and slap-dash in effect. The transparent overglaze also is less smoothly applied, and on many surface sherds it has cracked away almost completely. One is left with the impression that a highly stylized, near-luxury product of a former period had become only a distant prototype for a product of widespread, localized manufacture.

Newly introduced for bowls is glaze of a very deep (manganese-) violet, sometimes appearing almost black. Application to the exterior is also careless and limited to the upper part of the vessel, but interior surfaces are notably smoother and more even in color.

Finally, there are the twelfth century (and continuing) traditions of black and blue underglaze painting. Generally more common in rural central Iraq are black linear or reserved designs under dark green or blue lead glaze, but there are also floral patterns in blue or black beneath a white or pinkish glaze (Safar 1945, pp. 41–42). Both are typically applied to relatively well-made, thin-walled, flaring-sided, ring-based bowls.

Little systematic attention was devoted to ceramics of the Ilkhanid and more recent periods, here designated as Late Islamic. Sedentary life appears to have been in eclipse within the area of intensive survey until toward the end of this seven-century span, and mounds whose elevation reflects a continuing buildup of debris from occupation during the greater part of it are rare. Equally rare even on those mounds, moreover, are glazed ceramics of documentable antiquity, traded in from urban centers around the peripheries of a region mostly given over to tribal dissidence. Surface reconnaissance is largely tied, therefore, to highly localized, utilitarian and autarkic traditions of pottery manufacture whose thin remains on a diffuse scatter of sites would be very difficult to place in chronological order.

Some use of blue glaze, primarily for large-bowl interiors, continued until the threshold of modern times. The glaze on more recent examples tends to be thin and rough to the touch and to flake away exposing an underlying fabric that is pinkish and granular. Green glaze and a grayish white lead glaze that usually has a curdled or pitted appearance also occur very sporadically. Hand-made, low-fired, unglazed basins and jugs with large, irregular grit inclusions probably represent another continuing tradition. Fragments of this type are widely referred to by local residents today as "bedouin" pottery, and unquestionably it would be an appropriate article for fabrication in a bedouin encampment out of touch with any market center. The same kind of ware, particularly taking the form of deep bowls, is frequently found with fugitive traces of painted geometric designs that have been designated "pseudo-prehistoric" (Safar 1945, p. 38; Adams and Nissen 1972, pp. 67–68). Not a few sites on

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which this pottery is found also have spent cartridges, uniform bottoms, and the fragments of china teacups that signal the reopening of the region to at least indirect and intermittent contact with distant centers by the later nineteenth century.

# Conclusion

It would be redundant if not misleading merely to summarize at a more abstract level an account that already includes a fairly large measure of synthetic reconstruction. As I noted earlier, no single, distinctively Mesopotamian paradigm of settlement has emerged whose physiognomy becomes recognizable only in the heartland of the region. To distill a single harmonious and consistent pattern out of the many unstable and discordant elements that have been described would not only do violence to many of them individually but would have the more pervasive effect of suppressing one of the main sources of dynamism accounting for the region's historic creativity and importance. So the foregoing chapters will be left without a briefer recapitulation, contributing something, it is hoped, to an enhanced understanding of the Mesopotamian record of demographic, agrarian, and urban development.

Yet at the same time this study cannot merely acknowledge the virtual end of its supply of primary survey data in the Middle Ages and fade away into the silence of the Great Swamp along with the dwindling number of those remaining who were inhabitants of the central Euphrates floodplain. Research domains worthy of exploration may twist and unfold or come together and take new forms, but since they are not self-enclosed they never simply terminate. In entering them at all, therefore, we assume some responsibility to suggest their continuing and wider resonances. Other themes of comparable importance could perhaps be cited, but there are three larger issues in particular on which this study may conclude by at least drawing together diverse earlier strands into a more coherent position.<sup>1</sup>

The substantive foundation of this study, though it has ranged widely (and perhaps incautiously) into other disciplines, has been the findings of archaeological surveys devoted to settlement and irrigation patterns. Two principal categories of data have been assembled: an array of

ancient settlements that can be described in terms of size and periods of occupation, and the traces of at least some of the ancient watercourses that made those settlements habitable. What connects the two in the most narrowly empirical sense is that they accompany one another according to an obvious and inescapable least-effort principle. In an otherwise relatively featureless and arid landscape, human communities either gravitate to their water supply (and incidentally, best available means of bulk transport under preindustrial technological conditions) or redirect that supply to their preexisting centers if it is diverted elsewhere by natural or human agencies. The irrigation patterns greatly enrich an understanding of the settlement patterns and in turn cannot be understood except insofar as periods of use can be assigned to components of the watercourse network on the basis of the dating of adjoining archaeological sites.

The first of the broader themes arises from consideration of a common characteristic of these two kinds of data. It is in the nature of both that marshaling them contributes to a reorientation—happily, already under way—of the premises and priorities with which research on ancient Mesopotamia is carried forward. Indexes like settlement size admittedly may be only roughly related to many more interesting political and economic institutions. The time periods it has been possible to distinguish in the archaeological surface collections are exasperatingly long from the viewpoint of anyone concerned with finer-grained studies of social process. But these are entities that now approach a status of having been assembled comprehensively within a fairly inclusive region, and they can be quantitatively expressed. The systematic counting is important, not diversionary. As Georges Lefebvre was wont to say, “Pour faire de l’Histoire, il faut savoir compter” (Cobb 1971, p. 1527). Methods can and will be refined, but the introduction of measured aggregates

not only permits "testing" and consequent refutation or improvement, but also encourages the generating of new hypotheses. Crude and inconclusive as the first steps may be, they must be taken if we are ever to move beyond theories that remain permanently tangential to one another because they rest on each authority's subjectively chosen metaphors and examples. If there is ever to be a discipline that brings archaeology and Oriental history together around a common subject matter, it will have to be built not on the best-preserved, most vivid, or most evocative, but on what has painstakingly been established to be the most commonplace.

By an extension of the same principle, the use of data gathered in a more or less uniform way tends to unify the entire span of Mesopotamian history. In particular, it helps to break down chronological divisions that, through their association with fairly coherent bodies of linguistic and textual source material, have become barriers to communication between modern specialists. One need not be a fervent believer either in complete cultural continuity or in the lack of it to see the advantages of reducing these barriers. Only when genuine comparisons across long intervals of time are possible, transcending the specialized biases and limitations of particular archaeological assemblages and genres of texts, can we begin to understand why certain patterns developed cumulatively while others went in a different direction and flourished more briefly.

The other two broader issues require a more extended discussion. Both begin once more with the dependence of this study on the ancient canal- and settlement-pattern data, but each proceeds from there in a different direction.

### ANCIENT MESOPOTAMIA AS AN IRRIGATION SOCIETY

The existence side by side of these two distinct bodies of data focuses attention on the relationship between a prevailing mode of subsistence—in this case one dependent on canal irrigation—and the social institutions that either were superimposed on it or were generated in response to its internal stresses and requirements. The ancient settlements that were located during the surveys included an unusually large, and uniquely early, proportion of cities. Not to depreciate later achievements, the repeated reminder is useful that we are dealing here with the remains of the world's earliest literate civilization. It is not possible within the scope of an already extended study to survey even the most important and enduring features of the institutional structure that characterized that civilization. Nevertheless, we should not wholly ignore the question whether, and in what manner, some of the social concomitants of irrigation exercised a wider influence on the course of societal development. What was the relation-

ship, if any, between a precociously early and long-persisting growth of urban life and major reliance on irrigation agriculture?

Probably the most fundamental advantage of irrigation, here as elsewhere, was the relatively high agricultural productivity it permitted. It was unquestionably of great importance that yields were high, in relation to land as well as labor inputs. To the degree that environmental challenges were successfully met, large surpluses thus could be mobilized above the needs of the primary producers. Additional labor services could be extracted from the agricultural population during at least a part of the year, supplemented by those that could also be furnished by pastoralists living in a generally symbiotic relationship with the cultivators. As one consequence, relatively high population density was attainable even at a fairly simple, only slowly improving level of technique. At least equally important, considerable proportions of the population could be maintained in specialized pursuits rather than in agriculture itself. All this is obvious and long understood, and needs no more than brief acknowledgment. Perhaps we can describe these conditions as tending to be necessary in some degree for the growth of an urban civilization anywhere, but they do not significantly advance our understanding of the major structural features characterizing this one in particular.

Still less useful as an explanatory framework for at least Mesopotamia are the sweepingly systematic views of K. A. Wittfogel (1957). Insofar as conditions denoted by his construct of a rigidly authoritarian, centralized, bureaucratic "Oriental despotism" ever were even remotely and briefly approached in this historical and geographic setting, they were never a norm and instead might be described as a kind of asymptote or limiting case. Underlying Wittfogel's view is an insistence that the management and coordination of an irrigation system of any size requires a despotic political regime that completely suppresses the scope of action and autonomy of all other societal groupings within its compass. It should have become apparent in the earlier chapters of this study that in Mesopotamia that kind of unrestricted power was conspicuous by its general absence, and that even in the conduct of irrigation the hand of the state was only selectively and episodically applied.

Another difficulty is that Wittfogel has chosen to focus on a single, somewhat questionable or at least contingent variable in a complex, interdependent set. A central finding of chapter 1 was that the most decisive factor was the irregularity and unpredictability of the water supply. Conflict and competition over it was unavoidable, since no technical means existed by which a position of advantage with respect to access to water could be permanently assured. Water scarcity was thus likely to be at the root of many efforts at political consolidation in the hands of new dynasties, regional coalitions, and other groupings, and

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it was just as likely to produce the coalitions that ultimately were their undoing.

As we have seen, the hydrological characteristics of the two rivers were such that only the Euphrates was a significant source of irrigation water for most of Mesopotamian history. Both its modest aggregate flow and its wide month-to-month as well as year-to-year variability meant that substantially less than half, perhaps even less than a third, of the alluvial plain between the two rivers could have been reliably irrigated until the Tigris was brought extensively into service in Hellenistic or early medieval times. In earlier antiquity the problems of dealing with the Euphrates were exacerbated by its natural division into an inherently unstable network of interconnected branches.

In the largest sense, Mesopotamian cities can be viewed as an adaptation to this perennial problem of periodic, unpredictable shortages. They provided concentration points for the storage of surpluses, necessarily soon walled to assure their defensibility. The initial distribution of smaller communities around them suggests primarily localized exploitation of land, with much of the producing population being persuaded or compelled to take up residence within individual walled centers rather than remaining in villages closer to their fields. Tending to contradict a narrowly determinist view of urban genesis as merely the formation of walled storage depots, the drawing together of significantly larger settlements than had existed previously not only created an essentially new basis for cultural and organizational growth but could hardly have been brought about without the development of powerful new means for unifying what originally were socially and culturally heterogeneous groups.

Also denying the existence of a smoothly deterministic sequence are temporal and regional variations in the process that were described in chapters 3 and 4. The historic pattern of competitively coexisting city-states is foreshadowed in the Nippur region already in the Early-Middle Uruk period, for example, but farther to the south Uruk seems to have remained for a long time afterward a different kind of center with a larger, heavily populated hinterland. As is suggested by the apparent prominence of temple architecture there (one might wish that its excavators had given more attention to contemporary domestic quarters), its leadership was perhaps legitimated in relatively less pragmatic or political and more theocratic terms. Similarly unexplained by any simple, deterministic reconstruction is the prolonged period during which sedentary occupation seems to have been extremely limited, followed within the space of no more than a few centuries by the appearance of differentiated urban hierarchies. Immigration may well have occurred, but it also contributes little to an explanation, since we can find no source for a major stream of colonists who could have brought urban institutions with them. A fortified

storage depot model of urban origins simply does not work very well unless there has been a long-continuing buildup of population to generate competition over scarce resources. And, at least from what is now known, it does not appear that occupation in southern Mesopotamia became dense enough before Early Dynastic times to make collisions of interest between major population clusterings unavoidable.

Still a further difficulty is that the proportion of urban settlement never attained a constant level suggestive of some ecological determinant. It reached a remarkably high level for a time in the mid-third millennium, when we have seen in chapter 4 that almost four-fifths of the population of the central floodplain was apparently crowded into large urban nuclei each covering more than 40 hectares. Thereafter it declined steadily, however, reaching a low of less than one-sixth at around the beginning of the first millennium B.C. before once more beginning to climb. Clearly, there were important considerations at work in determining the extent of urbanization other than merely the concentration and defense of surpluses as an adaptation to the uncertainty of the water supply. But it seems equally clear that the long-continuing existence of city-states as elementary building blocks of Mesopotamian political and economic life, as well as the abrupt changes in political fortune that individual cities repeatedly underwent, cannot be understood without reference to the instability of the scarcest and most critical resource in their environment.

Broadly speaking, contention over water divides upstream and downstream competitors. The cumulative advantage lies with those farther upstream, but its effectuation came piecemeal and was repeatedly altered and deferred by the unstable Euphrates regime of multiple natural channels. Moreover, the initial possibilities for developing techniques of irrigation appropriate to dispersed, relatively small and weakly organized communities lay either along the Zagros flanks (and hence largely outside the framework of this discussion) or in the lowermost portions of the alluvium. The advantages of the latter were that reduced stream volume and velocities and relatively low levee topography tended to simplify canal construction. Hence it is no surprise that the early cities were largely concentrated in the south, or that later there was an irregular but cumulative northward progression in the centers of population and power concluding only with the founding of Baghdad as the 'Abbasid capital.

Major upstream-downstream rivalries for a long time took the form of politicomilitary contention between city-states, and considerable evidence that maneuvers over access to water played a part in this can be found in chapter 4. But localized tendencies of the same kind must have been no less important, even though the limited purposes of the existing textual sources generally were not such as to deal with them explicitly. On any canal long

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enough to accommodate different groups of cultivators, users nearer its inlet are prone to protect their own fields against the uncertainty of future water supplies by irrigating excessively rather than leaving an equitable share for those below them. Inadequate upstream maintenance also has little effect in that area initially, but it quickly reduces the proportion of flow available to those dependent on the tails of the canal for their cultivation. Furthermore, opportunities for intensive summer cultivation, including the all-important growing of dates, accrued to those with the best-assured access to water—that is, with lands either along the major channels or near the offtakes from them. Herein lay an inconspicuous, slowly developing, but very powerful source of internal social and economic stratification. It may well be that differentiation along this and similar lines had as much to do with the appearance of complex, hierarchical state and urban institutions as the much more frequently and explicitly chronicled rivalries that took an interurban, overtly military form.

It has been convenient heretofore to express the challenge presented by this ecological setting in terms of the single threat of water shortage. That should be understood as vastly oversimplified, although it does seem likely that the availability of water was usually the most difficult and immediate problem. Locusts and other pests, crop diseases, and late spring flooding before the crops could be harvested are merely illustrative of other environmental dangers. Nor were human predators, individually or in organized bands or armies, any less destructive and difficult to deal with. Soil salinization is perhaps representative of the intersecting human and natural vectors that must have been most common. Although the rise of saline groundwater was a natural phenomenon, it was hastened by overirrigation and was selectively most damaging to those cultivating depressions near the tails of a canal system. What these agencies all have in common is that they could be neither predicted nor substantially controlled with existing technical means. Hence in response to all of them the husbanding of surpluses under hierarchically organized institutions with even a modest, strictly relative assurance of continuity represented the most broadly advantageous course of action that was available. This further implies, of course, that irrigation should be seen not as an independently decisive force engendering the development of cities, but rather as one of the most important of a group of such forces that tended to pose social challenges of a particular kind.

Three successive, broadly contrastive patterns or configurations are evident in the stream and canal networks that have been described and mapped for different periods. The first, applying to the Uruk and Jemdet Nasr periods, appears to have been an essentially natural system of bifurcating and rejoining river branches. Only

quite limited portions of it can be recognized directly, except for a fortunately preserved, extremely sinuous reach north of Nippur, but linear alignments of sites suggestive of lengthy, wholly artificial canalization are at best very rare. Irrigation must have been accomplished by damming the natural distributaries and then conducting water to the fields by relatively small-scale canal construction and localized flooding. The depth of the belt of cultivation was probably seldom more than a few kilometers, so that almost all settlements are likely to have remained as close to the parent watercourses as factors like localized dangers of flooding would permit. While potentially of great interest, nothing further can be said at present of this most ancient pattern.

The second configuration applies to the third, second, and early first millennia B.C. For most of this span population levels were considerably higher than earlier, while the number of channels had been sharply reduced (possibly with increasing climatic aridity as a factor). Thus each of them was accompanied by a deeper belt of cultivation, and around the major cities there must have been still further widening. At times, as in the mid-third millennium, the number of settlements was relatively small, and their average size was correspondingly large. Hence almost all sites at that time could be accommodated along the parent watercourses. At other times, as in the late third and early second millennia, there appears to have been a breaking away from this intense stress on urbanism and a dispersal of smaller settlements along branch canals leading laterally away from the major channels. But the depth of the belt of cultivation, insofar as it can be deduced from the location of often quite minor sites placed along the branch canals, probably still did not extend more than 15 kilometers or so to either side.

The major watercourses, though derived from what had initially been natural channels, gradually assumed an increasingly canallike regime as the inhabitants of the area undertook to dike, straighten, and deepen them, primarily to assure the passage into the cities of barges with bulk foodstuffs and other riverine commerce. Substantial brick-lined dams and reservoirs also were within the realm of construction capability. Evidence for the actual construction of large facilities is rare, however, and most of the technical terms associated with them seem to have been introduced no earlier than the mid-third millennium. This was five centuries or more after the appearance of true cities by any definition. It suggests that, if anything, large-scale, complex irrigation practices were a derivative of the prior development of urban and state organization, rather than vice versa.

One should bear in mind that this second watercourse configuration was not for the most part a product of planned, systematic construction but instead was an outgrowth of many centuries of small-scale modifications and improvements. The individual branch canals, which

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were the operating units of the agricultural economy, lay well within the capabilities of local groups to construct and maintain (Adams, n.d.). Nor is there anything to suggest state involvement in the processes of water-sharing and allocation at the local level, or more than rare state intervention in the resolution of small-scale, local water disputes. A number of royal inscriptions proclaim state initiatives in canal construction, to be sure, and it can be shown that the necessary funds for some of them came from state treasuries. But the execution of such projects was generally left in local hands, subject to varying degrees of state supervision. There are references to corvée labor that must have been applied in part to improvements in the river or canal system, although at least in existing sources other civic projects seem to have received the lion's share of it. Moreover, textual evidence suggests that much of the basic construction as well as maintenance often was assigned to local contractors of hired labor who acted as at least semi-independent entrepreneurs.

All in all, the irrigation system and the major institutions of the urban society seem to have coexisted with little to suggest their close interaction or interdependence. Rather than the state using its necessary control over irrigation as a source of wider political leverage, the evidence (admittedly limited and not conclusive) could better be interpreted as indicating that involvement in irrigation was one of the means by which the state sometimes sought to extend its control over the countryside. And characteristic of this second configuration was a still limited scale of network development, essentially confined to enclaves having a single city and its outlying dependencies as the service area rather than building up a system of primary, secondary, and tertiary canals that served numerous cities and had an interregional character.

At least at the time of its clearest and most extensive articulation in the Sasanian period, the third configuration was dramatically different from the second. However, its very massiveness and geographical all-inclusiveness then has meant that there is little opportunity to observe the steps by which it may have been more gradually introduced from Neo-Babylonian times onward. Moreover, there must have been at least foreshadowings of it already in much earlier times. If our information were more adequate, the Ur III irrigation system might be found to have in some respects closer relationships with the Sasanian configuration—in complexity, certainly not in scale—than with the preceding one to which it is assigned partly on chronological grounds. It also seems not unlikely that the intensive development of the northern part of the Mesopotamian plain that began with the First Dynasty of Babylon could have been characterized by similar developments.

However, the possibility of a significant break or turning point before the introduction of an essentially different

configuration in the late periods cannot be dismissed. The increasingly large-scale use of new types of more effective lifting machinery to supplement gravity-flow canals, after roughly the middle of the first millennium B.C., would have been perhaps the most significant element of change. There is no way yet to quantify its effects, but we have seen that the ubiquity of such machinery by no later than the early Sasanian period is well attested in the Talmud. Similarly, movement from the Euphrates to the Tigris as the vital axis of political and commercial life, not to speak of the vast extension of the Sasanian canal system that depended on a considerable if supplemental use of Tigris water, would have been unthinkable without the new devices. At a quite different level, the evidence of agricultural intensification as early as the Achaemenian period provides other hints of a new approach. In particular, the relatively very high charges then levied for what amounted to the use of water from state-owned canals seems to imply an awareness of possibilities of economic expansion that were tied to an ascending rate of state investment in the irrigation infrastructure.

The main features of the new configuration are clear, even if their antecedents thus remain somewhat doubtful. Very large districts, covering not much less than the entire alluvial land surface that was not rendered uncultivable by swamps or other problems, were systematically gridded with canals of large dimensions. Their straight courses, fairly even spatial distribution and geometric layout, and various technical features reflect centralization not merely of planning but of at least some phases of construction and maintenance. Major artificial arteries like the still-impressive bed of a canal known as the Shatt al-Nil north of Nippur could be undertaken virtually without limitation of size or length; the Nahrawan canal in the Diyala region is merely the largest and heretofore most extensively studied example of this (Adams 1965).

The ambitiousness and complexity of these schemes strongly suggests that components of the irrigation system of the time were planned and constructed according to uniform standards by full-time, specialized, technically very competent cadres. This presupposes a new and more intensive degree of state involvement in initially constructing, and probably also in maintaining, the major arteries of the irrigation system. Perhaps the most significant achievement under the new auspices, and one that placed the greatest demands on administrators who could no longer operate exclusively within a framework of local or parochial interests, was the integration of Tigris and Euphrates water supplies in order to maximize the extent of cultivation. What is more difficult to establish, however, is how far central control extended into the secondary and tertiary networks of canals that were fed from the main arteries.

Existing accounts make no reference to state officials' taking up residence in the lesser settlements and rural



districts, as they would have had to do if the entire irrigation system were under their active supervision. The more normal pattern, as in the collection of head taxes and land taxes, probably was to make at most a few visitations a year while leaving the implementation of the state's demands to local notables. Together with the considerable autonomy of internal administration on the part of the religious communities, this suggests that state intervention was sporadic and largely nominal, except for a handful of the larger towns and strategic control points on the major roads and watercourses. Applied to irrigation, this almost certainly would have meant that water in only the main canals was under state control. It would then be supplied to even the major secondary canals only for specified periods on some rotational principle, and within the terrain served by each of them water allocation and the settling of disputes over it would have been left entirely in local hands.

Thus the administrative veneer seems on the whole to have been fairly thin. Not reaching deep into the fabric of rural life, the irrigation administration was not an effective lever of wider political control. Cutting off the supplies of whole districts was too general and self-destructive a weapon to be wielded against even the most menacing coalitions of opposing forces, and there is no evidence that the state ever resorted to its use. Similarly, although the regime was in a position to enforce severe discipline among its own cadres of irrigation specialists (and reportedly did so during the flood disaster in 628), its control over masses of corvée labor would have had to be more indirect. How extensively corvées were used in connection with irrigation construction is therefore quite uncertain. Al-Hajjaj's employment of corvée labor for this purpose in the Early Islamic period seems to have been regarded as a noteworthy and hence rare if not exceptional instance, at least from the perspective of his times and quite possibly with reference to the preceding Sasanian period as well. Corvées or their functional equivalents must have been convoked by local notables for service on the lesser components of the system for which they were responsible, as they still are today by tribal shaykhs or their sirkals in southern Iraq. But this can in no sense be regarded as a manifestation of despotic state power stemming from its control over the irrigation system. The state's best alternative accordingly was to develop its own corps of specialized workers for service on the larger projects of irrigation canal (and perhaps other) construction. That practice is well attested for the 'Abbasid Caliphate, as we saw in chapter 5, and its occurrence then seems likely to be merely a restoration of the Sasanian pattern.

Once more, therefore, we are left with a general picture in which the institutions of central government and the irrigation system exhibit only a limited, loose coupling with one another. Irrigation agriculture was explicitly

recognized as a principal prop to the prosperity of the realm and hence to at least the fiscal strength of the state, but the areas of direct intervention that were considered feasible were very circumscribed. The strategy of the crown, during the fairly limited periods of its relative ascendancy over the landed nobility and other particularistic forces that generally opposed it, was not so much to transform existing social and economic structures as to deploy its strength outside of them—founding new cities, campaigning across the Byzantine frontiers, and so forth. The instituting of a nobility of service under Khusrau I Anosharwan may represent a departure from this practice for a time in the later Sasanian period, in the direction of countering the nobles' strength with greater administrative or bureaucratic "density." But in the progressive breakdown of central power that ensued under his successors the balance tipped once more in the opposite direction.

Impressive as some of the technical achievements connected with this third configuration certainly were, furthermore, we should not lose sight of the fact that they failed to enhance the fundamental stability of the state. While greatly expanding agricultural production and providing some protection against minor, local variations in output, they even intensified certain other problems. The giant new canal networks disrupted earlier, natural drainage patterns, for example, and hence must have been quickly followed by serious difficulties with salinization. Other declines in productivity would have resulted from the expansion of the canal system into areas previously judged less fertile and rewarding than those already in cultivation. Mention was also made in chapter 5 of the virtual certainty that the proportion, and probably also the absolute number, of livestock fell, with the consequent partial loss of this important reserve subsistence source.

Against these negative factors there was, to be sure, a great extension in the aggregate cultivated area and presumably also some improvement in the supply of water to the individual cultivator. But the continuation of this was now increasingly dependent on the effective functioning of a specialized corps of engineers and administrators. If the state's executive authority was compromised by dynastic intrigue or dissolved in chaos, this corps also soon abandoned its work and began to drift away from its posts. Nothing had changed to give greater assurance of survival to the state itself. But in the event of its collapse the new irrigation facilities of unprecedented scale and complexity fell back on local groups without the resources or experience to maintain them.

The relationship between irrigation and many of the most pervasive features of ancient Mesopotamian society thus seems to have been very substantial, but it is also relatively generalized and hence difficult to document. A dense population was sustained on the basis of irrigation agriculture, of which a high proportion could be

engaged not in primary subsistence pursuits but in burgeoning crafts, commerce, cults, and administration—the activities we rightly think of as constituting the hallmarks of any ancient civilization. The uncertainties inherent in irrigation provided an important stimulus to the growth of cities and of hierarchically organized institutions within them that could serve to husband and redistribute subsistence and other resources. Also inherent in it were inequalities of access to the main factors of production, and these must have at least accelerated the growth of systems of social stratification. But on the other hand irrigation seems to have had relatively little direct influence on the growth, powers, forms, or legitimation of the institutions of centralized authority. A more indirect influence in this realm as well is not to be denied, of course, since it is difficult to imagine the existence of any of those institutions except in the politically unstable, stratified, urban context that in southern Mesopotamia irrigation was primarily responsible for making possible.

## ANCIENT MESOPOTAMIA AS AN URBAN SOCIETY

The other empirical foundation of this study is the physical remains of ancient settlements, urban and otherwise. These have been the primary objects of discussion in many of the foregoing chapters, so that the reconstruction of a developmental sequence paralleling that just given for the irrigation system would be unwarranted. Analytically, however, they present a very different type of problem. In the narrow sense, the clusterings of broken brick and potsherds that the archaeologist finds are merely nodes of concentration in a series of overlapping, but not identical, subsystems of activity: residence, government, exchange, worship, redistribution, and so forth. But in a larger sense they are symbolically and practically often almost coterminous not merely with the exercise of political power but with the outstanding cultural achievements of the civilization. Clearly, it is beyond the scope of this study to deal with ancient settlements, particularly urban ones, as cultural exemplars in this larger sense. But, once again, we cannot justifiably evade the question whether, and to what extent, the urban basis of Mesopotamian settlement exercised an enduring, distinctive influence on the whole of the region and on the society there.

One aspect of this theme has already been adumbrated in chapter 3, in connection with a discussion of states and cities as the principal focuses of alternative research paradigms or strategies. States, capable of being formulated in terms of specified structures of activity whose presence or absence is presumably “testable,” offer what some scholars think are decisive advantages. Urbanism is indeed a much less rigorous construct to investigate, and its significance either as an influence on the larger institutional structure or merely as a characterization of

state structure is more likely to vary according to context. But particularly when defined as part of an essentially archaeological framework of investigation, the state tends to become an artifact of the measurements taken to determine its presence or absence rather than a recognizable form of governance. What is likely to have been for a long time a changing, indeterminate mixture of different modes of social integration is too easily seen in only its narrowly operational, political-administrative aspects. The probability that the latter were of some importance even at the very outset of urban life is certainly not to be denied. However, the flux that has been evident throughout this account of the Mesopotamian social landscape suggests that politically or administratively implemented hierarchies of power often led a fluctuating, contingent existence. Cities, meanwhile, constituted the most visible and enduring realities of social life. That is why it has seemed more worthwhile here to regard them as the primary object of study.

In a way, Mesopotamian cities can almost be said to be coterminous with the underlying conditions for civilized life as it materialized there. At the heart of cities were large, interlocking institutions administered by relatively self-conscious elites, whose thoughts and activities as individuals alone have come down to us through the clay tablets they left. Only in the cities were to be found the monumental repositories of religious belief and tradition. Also virtually limited to an urban context were capabilities for abstract thought and hence for complex, long-range decision-making, insofar as these presupposed literacy and corporate, transmissible memory embodied in written archives. Finally, as I have already noted, within the capabilities of ancient technology it was cities that offered a strictly relative but still decisive degree of protection against natural disaster and military threat.

But to define all these as urban phenomena may imply taking for granted that the role of urbanism was all-inclusive, rather than formulating an open question to which a qualified or even a negative answer is conceivable. No matter how the question is asked, however, it is very difficult to provide a satisfactory answer when the available documentary materials rather narrowly reflect the views and preoccupations of a limited upper stratum of the population wholly committed to an urban way of life. And archaeologists have unfortunately abetted this distortion by an almost complete lack of concern for excavating smaller, outlying settlements that were contemporary with the historic cities. At least until a shift in archaeological priorities makes a more balanced overview possible, the major means for correcting the existing picture lies in a comparison of it with the only available, although much more recent, works that do provide some insight into the nonurban setting. These are the accounts that left by travelers and sojourners in the region, part of whose attention was directly given to

the countryside. Fortunately, much of this variegated testimony that has accumulated over the past two centuries or so (including a regrettably still very small proportion of ethnographic research) is fairly consistent in the underlying patterns it identifies. It can be brought together with relatively more scattered and tenuous leads in the ancient archaeological and textual evidence to form a coherent reconstruction, even though for a long time to come any such reconstruction can only be highly provisional.

There are two principal areas of pronounced difference in emphasis between the analytical approach this study has taken, partly with this reconstruction of the enduring realities of rural life in view, and the city-centered view of all the primary ancient sources. Also contributing directly to the first was the research methodology of archaeological reconnaissance, for among its findings that cannot be ignored are gradations of size among ancient sites occupied during the same periods. There exists a large and respectable body of literature in economic geography demonstrating that, at least in contemporary situations where the question can be directly investigated, size tends to be highly correlated with number and complexity of urban functions. The first approach that the data demands, therefore, has been one that uses the shape and differentiation of the urban hierarchy as an indirect but important indicator of the relations between the major ancient urban centers and their hinterlands.

As I noted in chapter 4, however, the observations of patterned behavior that support this quite rudimentary analytical step seem to have had essentially no counterpart in the cognitive world of the ancient Babylonian. There is little to suggest that urban size was considered a significant variable in its own right. The concept of cityness apparently was essentially an all-or-nothing one, with individual cases either simply included within or excluded from the terminological category. Subsidiary settlements falling outside it, meanwhile, received strikingly little attention, in proportion not only to their considerable numbers but to their undoubted importance for at least certain aspects of urban well-being. It seems quite impossible that there were not regular, routinized forms of active urban intervention in the affairs of many of them, and rather likely that in some of the larger ones these had developed to the point where scribes and minor officials were sent on regular tours of inspection or even terms of duty. But while some of the subordinate towns must have been involved in this way, those below urban status were rarely seen as parts of an articulated system for regional administration. The same is even more true when we posit the necessary existence of other networks involved in the flow of goods and services, including (but by no means limited to) those concerning tribute or taxes, exchange, and redistribution. What is instead apparent is the lack of importance of settlements that were not de-

fined as having attained urban status, even from the narrow economic vantage point of their urban overlords, beyond the initial fact of their subordination to a particular city.

How can this curiously narrow, even dysfunctional, urbanite attitude toward smaller, dependent communities be understood? In part, surely, it must reflect the relatively much greater security and depth of tradition, not to speak of physical amenities, to be found within the largely self-enclosed world of the city-dweller. To that extent it merely confirms the modern analyst's expectation of an extremely circumscribed viewpoint in ancient literary testimony. But perhaps also it partly reflects the instability of relationships once they extended outside the walls of the city. Outlying dependencies, that is to say, received so little attention because there was little assurance of retaining any durable relationship with those living in them. The lesser towns were merely pawns caught in the continuing flux of interurban rivalries.

On the other hand, the existence of broad temporal and regional variations has already been invoked in a denial that there was any single paradigm. Therefore, a single explanation probably should not be expected to cover the general lack of concern for the functional aspects of urbanism that are responsible for the existence of an urban hierarchy. We have seen that Uruk had many outlying, smaller neighbors, most of them presumably in some sort of dependent status, until at least the late Early Dynastic I period. Small settlements were significantly more transitory in the Nippur-Adab region, and in addition many of them are so situated as to make allegiance to one or another of the nearby city-states a matter always open to disputes between the latter. Later periods of Mesopotamian history may offer other kinds of contrasts. As I noted in chapter 4, extremely small centers—"villages," in fact, according to the classification followed here that is based exclusively on size—were on occasion centers of complex administrative, craft, and even intellectual activity in at least the northern part of the alluvium. Later still, with the spreading use of iron, currency, glass, and many other products binding cities and rural regions into tighter, more continuous networks of exchange, it also seems likely that the insularity of urban attitudes at least must have begun to soften.

The second area of broad difference between the approach consistent with archaeological reconnaissance data and the perspective taken by most of the textual sources is also related to the smaller settlements. It involves the later, however, not as descending links in an unbroken administrative or commercial chain but as representatives of the rural hinterland more generally. As Diakonoff puts it, stress is placed on the rural community "as a mechanism of self-defence and co-operation of the free and more especially the free rural population outside the state sector" (1975, p. 130). Underlying this

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view is the perception that the prevailing relationship of city to countryside, in all periods, was one of exploitation within limits primarily imposed by interurban power rivalries. From the urban viewpoint, the assumed natural order was a continuing inward flow of resources up to or sometimes even beyond the capacities of the countryside for sustained replenishment. But while the vulnerability of the countryside is undeniable in most circumstances, its impoverishment could not have been absolute. In disclosing for the first time the very considerable extent of rural settlement in most periods, archaeological surface reconnaissance confronts us with suggestions of rural capabilities for rapid population growth and movement at various times—and hence of the deep-rooted tenacity and even vitality to be found there. It is only natural to inquire what adaptive strategies permitted numerous small groups of rural countrymen somehow to hold their own not only against the natural hazards and uncertainties that were common to all of Mesopotamia but against predatory urban inroads as well.

To judge from the only window on the countryside we have, with all necessary caveats over interpreting the more ancient past on the basis of tribal responses to conditions of Ottoman oppression that admittedly may constitute a kind of limiting case, an essential feature of this rural adaptive strategy generally has been the maintenance of corporate social groups that pooled labor and military potential while sharing risks. Kin-based groups of this kind repeatedly come more or less clearly within the peripheries of urban concern, as reflected in the cuneiform record, from the beginning of the third millennium onward. At times they appear in connection with the transfer of titles to land, but it is to be assumed that they occupied more or less well defined territories irrespective of the changing legal formalities of ownership in an urban context. Again to judge from recent practices, tendencies toward fission or fragmentation as a result of ongoing economic differentiation often may have been held back by the dispersal or rotation of individually assigned parcels of land. Also promoting the solidarity of such groups were reciprocal social and economic obligations between the leadership and agnatically related lines of followers. "Tribal" groupings of the type, it is true, could seldom offer more than scattered, temporary resistance followed by flight or passivity when state power was vigorously expanding. They may even appear from time to time (at least in the perspective of state administrators) as formally sanctioned, centrally controlled aspects of the state's own system of functionaries. But it is clear even in the ancient, urban-oriented textual evidence that they repeatedly remerged with renewed strength and independence when urban-based power coalitions lost their capacity to hold in check the many converging forces that were always working to erode their authority.

This same fluidity of rural adjustment must always have characterized subsistence practices. Defying traditional but misleadingly rigid categories like "sedentary" and "nomadic," rural social groups in Mesopotamia have essentially no choice but to maintain carefully balanced options of fairly nonintensive cultivation and pastoralism. Herds that can be driven as a group moves provide a complementarity of resources that gives some protection against crop failures, other natural disasters, and state incursions. Moreover, the existence of herds permits these groups, even when conditions favor their prolonged sedentism, to maintain a larger population as both a military and a labor reserve than is possible on the basis of irrigation agriculture alone.

The crucial attribute is rapid adaptability in the face of either social or environmental pressure. By shifting back and forth in their relative emphasis on more mobile pastoralism and more sedentary cultivation, components of the rural society can manage to survive, and sometimes to prosper, by filling whatever niche is available. Either they provide the lowermost, rural echelons in times of strong urban organization, or they take a more active, oppositional role when conditions for this are favorable. There was, in other words, another side to the coin of Mesopotamia's extraordinary precocity in the development of cities. This appears to have been the deep-rooted persistence in its countryside of essentially defensive formations of semisedentary, tribalized peasantry.

This is not intended as a denial that in most periods the urban forces decidedly held the upper hand. Their strength was firmly founded on the internal articulation of their complex, large-scale institutions and reserves. But there remained a significant niche on urban peripheries and in the countryside for more egalitarian societies following a strategy that stressed not stability but resilience (Adams 1978), and some of them continue in this strategy today. Adding to the difficulties of fully recognizing the role of their counterparts in antiquity is the fact that written sources tend to be least abundant during periods when dissident rural forces found their greatest scope for action. The reverse is also true, so that there tends to be a disproportionate historical emphasis given to the—relatively rare and brief—periods when there was a firm and undisputed urban or imperial power in place. But the more common condition throughout most of antiquity must have been a shifting mosaic of hierarchical, stabilizing tendencies associated with the ascendancy of one or another city, and leveling, fragmenting ones that extended deep into the countryside when its powers were seen to diminish.

The discussion in this section heretofore has certainly not been intended to deny the generally accepted proposition that Mesopotamia was a "land of cities." It has, however, introduced a few important qualifications to the all-prevailing dominance and uniformity of urban

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conditions that may have seemed implicit in such a description. There is one further step of the same kind to be taken, involving the spatial delimitation of how much was in fact urban within the historic and geographic entity of Mesopotamia. Archaeological survey has proceeded to a point at which there is more or less detailed information on ancient settlement patterns in most of the area that on textual grounds was of any real importance before the latter part of the first millennium B.C. Some regions can be generalized about with more confidence than others, to be sure, and there are problems and lacunae remaining in all of them. But the largest lacuna (the ancient kingdom of Lagash, most or all of which lay east of the modern Shatt al-Gharraf in terrain still awaiting an intensive topographic study), while clearly very important, is of relatively modest size in comparison with the area that has now been studied.

It is no longer possible, therefore, to imagine that the only limits of urban settlement in the pre-Hellenistic past were ever those of the alluvium itself. The same conclusion, one will recall, has been reached on the basis of a discussion of the irrigation potential of the Euphrates. We now know that the nucleus around which urban life formed and prospered was for a very long time a relatively limited part of the alluvium, and that even within the more limited zone there were large differences and periodic shifts in the pattern of urban size and density. With all the caution that the still rather heterogeneous as well as incomplete data make necessary, it may be worthwhile to outline briefly the growing as well as changing patterns of internal zonation that should be kept in mind when the idea of a "land of cities" is invoked.

The southernmost part of the alluvium seems to have played the key role during the earliest period of Holocene settlement, probably extending back into the sixth millennium. This may well have centered on the region around Ur that is covered in Henry Wright's concluding study, but it probably extended upward for some distance into the Uruk region as well. Only future study can determine whether it also included part of the kingdom of Lagash to the northeast, but it would not be surprising if the Gulf shoreline receded from much of this area only at a considerably later period.

Apparently quite abruptly and without obvious source or explanation, a part of the central floodplain then moved to the fore soon after the beginning of the fourth millennium, in terms of both settlement size and density. Not long afterward, sites had appeared that are unambiguously to be recognized as cities. But even after several centuries of further growth it appears that we still are dealing with a population for the whole alluvium of fewer than a hundred thousand persons, and that the small, scattered enclaves in which they lived were still largely confined to a relatively narrow band across its southern portion.

The increasingly dense settlement of the Uruk area in the Late Uruk period initiated a new period of population growth combined with migration, in some as yet undefined proportion. The southern part of the central floodplain remained the major locus of relatively high population density, although there was some thickening of very sparsely distributed settlements in other areas as well. Probably the first significant wider dispersal occurred at about the beginning of the third millennium, as is suggested by Kish's having moved into a position of political prominence well to the north. The lower Diyala region, on the other hand, continued for several millennia more to be relatively lightly occupied and hence less important.

There is no evidence of a substantial alteration of these regional relationships through most of the third millennium, although almost everywhere the pattern became denser as well as more continuous. At about the end of the period, during the Third Dynasty of Ur, population appears to have crept upward past the half-million mark. The whole northern region of ancient Akkad, as well as the Diyala region around Eshnunna across the Tigris, remained distinctly *triant* in terms of maximum settlement size, average settlement size, and population density.

The rise of Babylon substantially altered this in the eighteenth century B.C. There was a cessation of scribal activities, if not necessarily of all accompanying occupation, in a number of the southern cities, and a corresponding extension of settlement along what may well be newly constructed canals in the region north and east of Babylon. Salinization that had driven down agricultural productivity in the south may have set the stage for this, but it seems inadequate as the immediately precipitating agent for an event so abrupt and general. The first of an irregular series of westward shifts of the Euphrates also may have been a factor. This in turn opens the possibility of substantial new settlement in regions south of Babylon where survey is made inconclusive by massive, more recent Euphrates levee deposits. Hence it is almost impossible to hazard an estimate for aggregate population in the later second and early first millennia. To judge from the central floodplain, it had shrunk back to mid-fourth millennium levels, but this decline may have been partly compensated for by the founding of new dependencies of Babylon in districts to the south of it.

From this time onward there are increasing difficulties in providing even a rough and impressionistic overview. Part of the effect of the shift to the Tigris, completed by Hellenistic times, can be plotted with some accuracy in the immense growth of new settlement in the lower Diyala region. A similar but less marked process may well go on in part of northern Akkad, held back by the collapse of Babylon and the probable decay of its hinterlands and perhaps also by the destructive effects of repeated Roman invasions. But as yet we have no basis for even guessing

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at the corresponding developments along the lower Tigris, in Mesene and Characene. If what went on there corresponded to the Diyala plains behind Ctesiphon, then the Parthian period may have been a time of more rapid extension than any. It was, after all, a time when the density of occupation in the old urban nuclear zone along the southern levees in the central floodplain also increased very significantly.

The impressive extent of irrigation in the Sasanian period has already been discussed and presumably either was initiated by or led to further demographic growth. Some formerly cultivated land was lost to swamps in the south, but the intensification of canal construction that can be traced almost everywhere must have more than made up for this. Certainly there is evidence of a great increase in settlement numbers and density, and what is known of the history of the period does not suggest that conditions could have been different along the lower Tigris than in the regions already surveyed. This, it appears virtually beyond doubt, was the apogee of the ancient settlement and irrigation record in every respect. Yet, as I suggested in chapter 5 and again in the preceding section, there is persuasive evidence that the agricultural economy had begun to deteriorate seriously well before the onset of the Arab raids that culminated in the Islamic conquest. Extrapolating from what is known to the many important regions that are not, the population of the Tigris-Euphrates alluvium at the apex of the dynasty's strength and prosperity seems certain to have been well over one million persons and perhaps even approached two million.

The problems involved in estimating Early Islamic population have also been treated in chapter 5. On the one hand, much of the central floodplain was either engulfed by the spread of the Great Swamp or abandoned for other reasons. There was a considerable decline also in the Diyala region, to the north and east of the middle Tigris. On the other hand, documentary sources indicate that this was a time of some real growth based on swamp drainage and reclamation, principally along the lower Tigris above Basra. How nearly these two processes balanced out is quite uncertain from textual sources. It also may not be easily resolved by future archaeological surveys, since most of the region today is given over to intensive palm cultivation. What is not in doubt, however, is that by no later than the late ninth or early tenth century, and perhaps somewhat earlier in a few regions like the central floodplain, a general retraction of the cultivation frontier got under way. Within a few centuries, population levels had been carried back almost to what they were in the mid-fourth millennium. By the time of the fall of the caliphate in the mid-thirteenth century, the limits of sedentary life were being more and more narrowly drawn around the outskirts of Baghdad, Basra, and a handful of other towns. And it was only these few

towns that precariously managed to carry the continuous tradition of urbanism, in the land of its origins, through until the threshold of modern times.

The conception of a "land of cities" thus can be considered most nearly coterminous with the whole Mesopotamian alluvium as a physiographic region during the Parthian and Sasanian periods. At other times, later as well as earlier, it is applicable only to considerably less inclusive areas. Particularly during the fifteen hundred to two thousand formative years, what might be thought of as its nuclear zone grew only slowly from a very few thousand square kilometers to a figure hardly more than twice as large. Considered against the 50 to 60 thousand square kilometers that were potentially irrigable and cultivable (uncertainties over the position of the Gulf shoreline, as well as the extent of swamps, make a closer estimate unrealistic), this is a modest figure indeed. Even within the nuclear zone, moreover, the computer-generated simulations of land use in chapter 3 indicate that until almost the middle of the third millennium the cultivated areas in most cases were of limited individual size and were kept relatively distinct if not actually isolated from one another.

Considering the entire third millennium as well as the fourth millennium, the cumulatively substantial demographic growth that did occur probably was accommodated more through the expansion and coalescence of many of the internal enclaves than through marked or rapid extensions of the nuclear zone itself. The contrast between the apparent fluctuations of occupancy even in the immediately adjoining Ur region and the relatively solid, entrenched continuity in the central floodplain may be especially significant in this regard. Important as Ur was in religious, political, and commercial terms, there is a suggestion here that it was somehow compromised by a position well to the south of the demographic as well as urban core.

This is the sense, then, in which it still seems apt and accurate to speak of a "heartland." There was prodigiously creative phase in the growth of a civilization during which its developing centers somehow interacted synergistically in spite of their rivalries. Many other considerations seem to have favored the alternative path of wide dispersal, but the outcome was the consolidation of a region of at least relatively massive, interlocking, and irreducible demographic and economic strength. Yet it is important to remember also that the pattern was undermined and finally destroyed utterly in this particular setting, although only after the initiation of its subsequent, worldwide spread. We can reasonably conclude that it was not generated by any unique propensities of the landscape, and that we must look instead to the human forces that were harnessed in the building of the cities themselves.

# 7

## General Site Catalog

(For descriptions of sites 001–466 see Adams and Nissen 1972, Appendix.)

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| <p>501 — 250 NNW <math>\times</math> 180 <math>\times</math> 3.2. Little Parthian, mainly Sasanian–Early Islamic.</p> <p>502 — 180 E <math>\times</math> 140 <math>\times</math> 3. Middle/Late Islamic.</p> <p>503 Tūlūl Jumali. 700 NW <math>\times</math> 200–380 (see base map for irregular outline) <math>\times</math> 4.5. Sasanian–Early Islamic.</p> <p>504 Tūlūl Jumali. 220 diam. <math>\times</math> 5. Middle/Late Islamic.</p> <p>505 — Perhaps 80 diam. <math>\times</math> 0.6, but site boundaries are blurred by adjacent and underlying canal spoil banks. Sasanian–possible Early Islamic.</p> <p>506 — 130 NW <math>\times</math> 80 <math>\times</math> 0.8, extending over a portion of the former bed of the Shatt al-Nīl. Late Islamic.</p> <p>507 — 90 NW <math>\times</math> 40 <math>\times</math> 1.8, situated between two parallel branches of the Shatt al-Nīl. Late Islamic.</p> <p>508 — 350 diam. <math>\times</math> 4, bisected into E and W components by the broad bed of the Shatt al-Nīl. Early/Middle/Late Islamic.</p> <p>509 — 190 NNE <math>\times</math> 120 <math>\times</math> 1.4. On opposite bank of ancient levee is a slightly smaller mound, 150 diam <math>\times</math> 1.4. 300 m WSW is a third, 130 diam. <math>\times</math> 2.3. Late Islamic.</p> <p>510 — 500 NE <math>\times</math> 350 <math>\times</math> 6.5. Sasanian, a little Early Islamic.</p> <p>511 — 300 diam. <math>\times</math> 4.5, consisting of a loose grouping of mounds with some plain-level debris rather than a nucleated settlement. Sasanian–Early Islamic.</p> <p>512 — Scattered small mounds on both sides of the Shatt al-Nīl, forming a loose group 350 diam. <math>\times</math> 2.5–3. Sasanian–Early Islamic.</p> <p>513 — 180 diam. <math>\times</math> 3.5. Sasanian–possible Early Islamic.</p> <p>514 — 200 E <math>\times</math> 140 <math>\times</math> 3.5. Achaemenian–Parthian.</p> | <p>515 — 180 NNE <math>\times</math> 130 <math>\times</math> 1. Parthian.</p> <p>516 — The two arms of this site, meeting at an oblique angle as shown on base map, consist of compact masses of debris of fairly uniform elevation except where crosscut by a canal. WNW arm 700 <math>\times</math> 240 <math>\times</math> 4.5; ENE arm 550 <math>\times</math> 300 <math>\times</math> 4. Great quantities of black kiln fragments and chunks of black basalt from milling stones litter all portions of the surface. Mainly Neo-Babylonian–Achaemenian, some Parthian.</p> <p>517 Ishān al-Wa'y. The area of perceptible elevation is approximately 500 diam. The distinct mound, coinciding with substantial sherd concentrations, is 340 N <math>\times</math> 240 <math>\times</math> 5.5. Trace of Uruk. Achaemenian–Parthian.</p> <p>518 — 130 diam. <math>\times</math> 4.5, with smaller, lower outliers immediately SE and SSW. Parthian sherds may be only strays from neighboring site 517. Mainly Sasanian–Early/Middle Islamic.</p> <p>519 — 180 N <math>\times</math> 100 <math>\times</math> 5. Farther S along old levee are smaller mounds up to 90 diam. <math>\times</math> 3.5, interspersed with lower debris forming a narrow but fairly continuous ribbon of settlement. The main mound is Parthian–Sasanian. The smaller mounds to the S are Parthian–Sasanian–Early Islamic, but preponderantly Sasanian.</p> <p>520 Ishān Abū Judu. 260 diam. <math>\times</math> 6. Smaller, low mounds are adjacent S and NNE. The S mound is Parthian, the NNE mound Sasanian, and the main mound Early/Middle/Late Islamic.</p> <p>521 — 900 ENE, a strip settlement along an ancient canal levee. The WSW part of site is less than 100 width, very low; the ENE approaches 200 width and rises to 2 m. About 700 m W of the center of the site is a second, 130 NNW <math>\times</math> 80 <math>\times</math> 0.9. The WSW end of the main mound and the</p> |
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# General Site Catalog

- second mound are only Sasanian. The ENE end of the main mound is also Sasanian but continues into the Early Islamic and Samarran periods.
- 522 — 80 diam., mostly plain level, highest hummocks of debris only 0.3. Sasanian.
- 523 — 90 diam.  $\times$  0.8. Sasanian–Early Islamic.
- 524 — 220 NW  $\times$  100  $\times$  3.5. Middle/Late Islamic.
- 525 — Probably 180 diam.  $\times$  1.4, although dimensions are partly obscured by a superimposed dune. Sasanian.
- 526 — 240 E  $\times$  150  $\times$  2.5. Sasanian.
- 527 — 120 diam.  $\times$  2.2, with clusters of debris at plain level extending SW. Early/Middle/Late Islamic.
- 528 — 350 N  $\times$  150, rising in widely spaced summits near N and S ends to 2.6. Parthian.
- 529 — 130 diam.  $\times$  0.3. Middle Babylonian.
- 530 — 130 NNE  $\times$  90  $\times$  2.8. Sasanian–Early/Middle Islamic.
- 531 — 170 E  $\times$  90  $\times$  2. Neo-Babylonian–Achaemenian–possibly limited Parthian.
- 532 — At least 1,000 NNW  $\times$  250, with numerous semidetached mounds rising 3.5–4.0 and a few smaller, conical mounds to 5 m. Sasanian.
- 533 — 220 E  $\times$  140  $\times$  0.8. Parthian–Sasanian.
- 534 Ishān al-Khor. The main mound is 340 N  $\times$  240  $\times$  6.5, but continuous debris and low outlying summits that may be integral with the site extend 100 m N and 500 m SSE. The S end of the site is Parthian–Sasanian, the N end Early/Middle/Late Islamic.
- 535 — An area of debris at plain level that may be somewhat arbitrarily defined as 220 N  $\times$  120; occasional hummocks rise to 0.4 m. primarily Old Babylonian–Cassite, some Sasanian.
- 536 — 70 diam.  $\times$  1.3. Early/Middle/Late Islamic.
- 537 — 170 diam.  $\times$  2.2. Early/Middle/Late Islamic.
- 538 — 80 diam.  $\times$  0.6. Middle (–Ilkhanid)/Late Islamic.
- 539 — Perhaps 200 NNW  $\times$  100, but with only sparse surface debris at plain level so that limits are hard to define. Plentiful shells probably suggest recent, rather than necessarily ancient, swamp in this vicinity. Late Uruk; note extreme rarity of clay sickles.
- 540 — 240 NW  $\times$  150  $\times$  3. Sasanian–Early/Middle Islamic (–Ilkhanid).
- 541 Imām Najmi. 550 NW  $\times$  350  $\times$  4.5, with ancient canal bed separating S end from major part of mound. The well-known shrine has been most recently discussed by Paolo Costa (1971). Early/Middle/Late Islamic.
- 542 Probably this is the mound named by Kiepert (1883) Tell Abū Rūsiyāt. 900 NNW  $\times$  350  $\times$  6. Possible Neo-Babylonian–Achaemenian, mainly Seleucid–Parthian.
- 543 — 140 NE  $\times$  110  $\times$  1.2. There is also a small settlement of low, discontinuous mounds on the opposite, left bank of adjacent ancient water-course. Sasanian.
- 544 — 254 NNE  $\times$  120  $\times$  0.4. Sasanian.
- 545 — 60 diam.  $\times$  0.4. Sasanian.
- 546 — 360 N  $\times$  280  $\times$  5.5 Achaemenian–Parthian.
- 547 — 90 N  $\times$  70  $\times$  0.6. Sasanian.
- 548 — 110 diam.  $\times$  1.6. Adjacent W is a small conical mound that may be an ancient brick kiln. Parthian.
- 549 — Eight or more individual mounds, loosely grouped in an area 700 NW  $\times$  500, as shown on base map. Generally they are small, less than 100 diam.  $\times$  1.5. Surface debris over the entire area is dense and continuous. Parthian–Sasanian.
- 550 — 140 N  $\times$  90  $\times$  1.4, although a line of dunes overlies the N end so that the mound may continue farther in that direction. Sasanian.
- 551 — 300 ENE  $\times$  220  $\times$  3.5, with low debris extending an additional 120 m E. Possible Achaemenian, mainly Seleucid–Parthian.
- 552 — Scattered, generally low mounds and fairly continuous plain-level debris within an area 700 diam. The most prominent summit is W central, 180 diam.  $\times$  4.5. Achaemenian–Parthian.
- 553 — 90 diam.  $\times$  2.6. Neo-Babylonian–Achaemenian–Parthian.
- 554 — 220 WNW  $\times$  180  $\times$  2.2. 100 m NNE is a second, 220 WNW  $\times$  120  $\times$  2.2. Much brick-kiln debris. Sasanian.
- 555 — 420 diam.  $\times$  4.5. In addition, there is a strip of debris 30–80 m wide extending WNW along old levee; more scattered hummocks also occur ESE. Parthian.
- 556 — 130 diam.  $\times$  2.4. Parthian.
- 557 — 90 diam.  $\times$  2. Some pottery-kiln debris. Parthian, possibly also Sasanian.
- 558 — 280 diam.  $\times$  3. Sasanian–Early Islamic.
- 559 — 130 NW  $\times$  100  $\times$  2. 150 m N is a second, 190 diam.  $\times$  1.8. Sasanian–Early Islamic.
- 560 — 160 E  $\times$  120  $\times$  1.8. Sasanian–Early Islamic.
- 561 — 190 NNE  $\times$  140  $\times$  0.6. Parthian.
- 562 — 160 NNW  $\times$  90  $\times$  1.2. Trace of Uruk. Sasanian.
- 563 — 550 NNE  $\times$  300  $\times$  3.2. Parthian.
- 564 — 180 E  $\times$  120  $\times$  1.8. Middle/Late Islamic.
- 565 — 190 ENE  $\times$  100  $\times$  1. Parthian–Sasanian.
- 566 — 500 NE, varying in width from 100 to 250



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- m, ht. to 2.5 m. 250 m NW is a second, 70 diam.  $\times$  0.6, Sasanian.
- 567 — 160 NW  $\times$  90  $\times$  2.2. Late Islamic.
- 568 — 220 NW  $\times$  120  $\times$  2.2. Sasanian.
- 569 — 130 NW  $\times$  80  $\times$  1. Sasanian.
- 570 — 140 diam.  $\times$  2.2. 30–31 cm sq. bricks. Sasanian. The brick size may imply terminal Sasanian or even Early Islamic, but none of the pottery regarded in this study as diagnostic of the latter was identified.
- 571 — At least 250 diam.  $\times$  2.4, but limits of site are obscured by drifting sand. A canal from NW bisects the site but is obviously later, since its spoil banks are continuous through and beyond it and rather prominent. Trace of Parthian. Mainly Sasanian. There is a little scattered Late Islamic pottery along the spoil banks of the canal both NW and SE of the site itself.
- 572 — 130 NW  $\times$  60  $\times$  0.3. Late Islamic.
- 573 — 110 N  $\times$  60  $\times$  0.4, although the N end has almost certainly been cut away by the trench and accompanying embankments of the main drainage channel of the Mussayib irrigation project. Intensive collection made in circle of 5 m radius, center. Trace of Ubaid III. Mainly Early/Middle Uruk; Late Uruk limited to S end. There are a few later graves, at least some of them Ur III–Larsa, and a little Sasanian pottery also.
- 574 — 170 m SSW of 573. N mound 70 diam.  $\times$  0.2; S mound, 130 NNE  $\times$  30  $\times$  0.2, may only be a long tail to the N mound or may be slightly detached. Surface debris generally fairly sparse, although rich in artifacts of excellent craftsmanship. At least one apparent kiln was observed near N end. Intensive collection made in circle of 5 m radius near S end. Middle/Late Uruk. Note thin and exceptionally well made stone bowls, much chipped flint, numerous spindle whorls.
- 575 — 110 diam.  $\times$  0.4. There are very extensive, thick deposits of mussel shells NE and SE of the site, probably reflecting a relatively recent swamp in this vicinity. Middle (–Ilkhanid)/Late Islamic.
- 576 — Low hummocks of debris within an area 80 NNW  $\times$  10. Cassite–Middle/Neo-Babylonian.
- 577 — 240 WNW  $\times$  90  $\times$  2.5. Sasanian–Early Islamic.
- 578 — 90 WNW  $\times$  60  $\times$  0.5. Middle (–Ilkhanid)/Late Islamic.
- 579 — Irregular, small area of debris at plain level. Parthian.
- 580 — 400 E  $\times$  240  $\times$  4. Possible Achaemenian, mainly Parthian.
- 581 — 250 diam.  $\times$  5. Sasanian.
- 582 — A string of semidetached mounds along an ancient levee, 1,900 NW  $\times$  200–370  $\times$  2.5–3.5. Sasanian–Early Islamic.
- 583 — 250 WNW  $\times$  100  $\times$  1. Some Middle Islamic, mainly Late Islamic.
- 584 — Hummocks of debris suggesting at most a very small settlement, along the spoil banks of an old, low canal levee. Middle Babylonian, possible Neo-Babylonian. Trace of Parthian.
- 585 — Brick-kiln debris. Parthian–Sasanian.
- 586 — 90 E  $\times$  70  $\times$  0.2, with another still smaller (20 diam.) outcrop 200 m ENE. Site 585 is 30 m W. Ur III–Larsa.
- 587 — 700 WNW  $\times$  180  $\times$  with two 4.5 m summits spaced about 200 m apart along the axis of the site. A few 21 cm sq. brick observed. Probably Parthian, mainly Sasanian. Apparently there was a small, continuing Early Islamic settlement, and the 21 cm brick may reflect some building even later.
- 588 — 160 WNW  $\times$  120  $\times$  2.5, with a smaller mound adjoining ESE. Sasanian.
- 589 — More than 500 ENE  $\times$  250  $\times$  6, with main summits at opposite ends. Lower debris tails off several hundred m farther ENE. Parthian–Sasanian. Some Early Islamic pottery is confined to ENE end.
- 590 — 180 E  $\times$  80  $\times$  1. Seleucid–Parthian.
- 591 — 220 diam.  $\times$  2. Sasanian–Early Islamic.
- 592 — From its size and location, this is possibly to be identified with the Talmudic Pum Nehara (Obermeyer 1929, p. 96). Approximately 800 NW  $\times$  450  $\times$  5, but cf. base map for irregular outline. There is a NE outlier, 350 NE  $\times$  300  $\times$  4.5. Sasanian–Early Islamic.
- 593 — Ishān Abū Khalesi. 300 NE  $\times$  180  $\times$  2.5. Late Islamic.
- 594 — 220 N  $\times$  100  $\times$  2.5, with additional small mounds 150 m N and S of main one. Sasanian–Early Islamic.
- 595 — 400 N  $\times$  200  $\times$  7. Sasanian–Early Islamic.
- 596 — 200 N  $\times$  140  $\times$  4.5. Parthian–Sasanian.
- 597 — 220 NW  $\times$  180  $\times$  5. Sasanian.
- 598 — 380 ENE  $\times$  170  $\times$  5.5. Sasanian–Early Islamic.
- 599 — 320 NNW  $\times$  220  $\times$  6.5. Limited Parthian, mainly Sasanian, limited Early Islamic.
- 600 — Dispersed, low mounds and fairly sparse debris at plain level cover an area at least 300 m in diam. The greatest elevation, 2.5 m, is at SW. Mainly Parthian, some Sasanian–Early Islamic.
- 601 — 180 diam.  $\times$  3.5. 250 m SE is a second, 100 diam.  $\times$  0.6. Sasanian–Early Islamic.
- 602 — 280 ENE  $\times$  100  $\times$  5. Seleucid–Parthian.
- 603 — 420 E  $\times$  320  $\times$  3. Within these limits the site consists mainly of dispersed mounds, but de-

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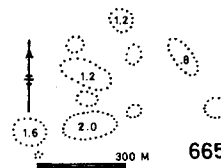
- bris is fairly continuous and most of the area is at least slightly elevated. Sasanian–Early Islamic.
- 604 ——— Triangular base on W, apex pointing E. 900 E × almost 600, composed of adjoining individual mounds rising to 4.5 m ht. Sasanian–sparse Early Islamic.
- 605 ——— A loose aggregation of mounds within an area 900 N × 400; cf. base map. Maximum ht. 4.2 m at N end. Sasanian–Early Islamic.
- 606 ——— 120 diam. × 1, with a band of low debris extending 300 or more m E. Seleucid–Parthian.
- 607 ——— 200 NNW × 120 × 4.5. A second 30 m E, of similar size but slightly lower. There is also a large, low N extension of the first mound. The mounds are Sasanian, but on the N extension there is also Early Islamic.
- 608 ——— 190 NNW × 90 × 2.2. Sasanian–Early Islamic.
- 609 ——— 110 diam. × 1. Sasanian–Early Islamic.
- 610 ——— 170 diam. × 2. 140 m W is a second, 100 diam. × 1.8. Many 21 cm sq. bricks. Possible Sasanian, mainly Early Islamic. The small bricks suggest a continuation into Middle Islamic times, but this could not be confirmed from the surface pottery.
- 611 ——— 320 E × 200 × 3, with the summit located near W end. Mainly Achaemenian–Parthian. A little Early Islamic.
- 612 ——— 240 E × 70 × 1.8, three small mounds in line. All are covered with brick fragments, and an even smaller brick-pile occurs 80 m SSE. Possibly the remains of irrigation canal headworks? Pottery very sparse. Sasanian–Early Islamic.
- 613 ——— 280 diam. × 4. Sasanian.
- 614 ——— 520 WNW × 350 × 7. Parthian–Sasanian–Early Islamic.
- 615 ——— 160 diam. × 1.6. Parthian.
- 616 ——— 180 diam. × 1.4. Sasanian.
- 617 ——— 300 E × 220 × 3.5. A little Achaemenian. Mainly Sasanian–Early Islamic.
- 618 ——— 450 WNW × 240 × 3. Achaemenian–Parthian.
- 619 ——— 180 NW × 100 × 2. Sasanian, rare Early Islamic.
- 620 Ishān Madhrūb. Slightly dispersed mounds occupy an area 1,100 NW × 350, but the principal mound bearing this name is 520 NE × 240 × 8.5. Achaemenian–Parthian.
- 621 Ishān Medar. 1,200 WNW × 480, dispersed mounds rather than a nucleated settlement. Mostly low, but ESE end rises to 4.5 m. Neo-Babylonian limited to low hummocks at the W foot of the site. Mainly Sasanian, including a small, isolated pottery kiln on a mound W of the main part of the site. Some Early Islamic.
- 622 ——— 160 NNW × 120 × 4. 80 m E is a second, slightly smaller and lower. A third, 140 diam. × 4, is 900 m SSE. Late Islamic.
- 623 ——— 300 E × 250 × 5, with low, small mounds covering an area immediately W that is almost as large. Sasanian.
- 624 Tell A'isha. 280 NW × 180 × 4.5. Late Islamic.
- 625 Tell Abū Zōfr al-Abyadh. 350 NW × 220 × 6. 50 m NW is a small mound, perhaps 50 diam., and low hummocks of debris extend SE along old levee. Mainly Seleucid–Parthian, some Sasanian.
- 626 Tell Abū Zōfr al-Aswad. 320 diam. × 3.5. 200 m SW is a second, 160 NE × 90 × 2.2, and there are smaller mounds S and SSE. Middle/Late Islamic.
- 627 Tell 'Amra. From Inspectorate of Surveys records, file 295, register 440. Recorded as Akkadian–Ur III. (N.b. This dating should be treated with great reserve. Early datings also were assigned in these records to sites 878, 882, and 891, none of which was found to have been occupied earlier than the Neo-Babylonian period.)
- 628 Tell Umm al-Buni. From Inspectorate of Surveys records, file 39, register 1587. Recorded as Neo-Babylonian–Parthian.
- 629 Jemdet 'Alka. From Inspectorate of Surveys records, file 26, register 1587. Recorded as Neo-Babylonian–Parthian.
- 630 Tell Abū Ghadara. From Inspectorate of Surveys records, file 25, register 1587. Recorded as Islamic.
- 631 Tell Mezerir. From Inspectorate of Surveys records, file 41, register 1587. Recorded as Parthian.
- 632 Tell Abū Sudayra. From Inspectorate of Surveys records, file 27, register 1587. Recorded as Neo-Babylonian–Parthian.
- 633 Tūlūl al-Tarhiya. From Inspectorate of Surveys records, file 282, register 440. Recorded as Islamic.
- 634 Bwaydhat al-Rubaydha. From Inspectorate of Surveys records, file 28, register 1587. Recorded as Sasanian–Islamic.
- 635 Tūlūl Tuwaymat. 170 diam. × 6. 200 m S is a second, 160 NW × 110 × 6. A small, low, parallel mound is adjacent S of the latter. Seleucid–Parthian.
- 40 diam. × 1.8. Sasanian.
- 637 ——— 180 diam. × 2. Achaemenian–Parthian–Sasanian.
- 638 ——— 200 N × 140 × 2. Sasanian.
- 639 ——— 1,000 NE × 650 × 2.5. Many bricks 37 × 16 × 7 and 30 × 30 × 7, numerous foundations or walls in place. Small, underlying Uruk, Akkadian settlements. Overwhelmingly Ur III–Larsa. There is also a little later (Old Babylonian, Neo-Babylonian, Parthian, Sasanian) pottery, but it can be characterized as a city with dense, continuous,

and prolonged occupation only during the Ur III–Larsa period.

- 640 Tell Nuwaija. 450 E × 270 × 4, surrounded and partly covered by dunes. Early Islamic–Samarrian, the W end continuing into Middle and Late Islamic times.
- 641 — 80 diam. × 0.7, tailing off ENE and WSW along right bank of pronounced old canal levee. Sasanian–Early Islamic.
- 642 — 40 diam. × 0.7. Parthian–Sasanian; the ceramics here suggest that the site may terminate before the occupation of site 641.
- 643 — In 1968 this site was noted as 180 NNE × 100 × 5, its NNE end cut away to some extent by the excavation of the main drainage channel of the Mussayib irrigation project. Subsequently the remainder of the mound was almost entirely destroyed by the excavation of a parallel channel to substitute for the original one. A second mound, several hundred m SW, is 120 diam. × 1.1. Its upper levels may have been scraped away, however, to serve as embankment material for the substitute channel. Parthian–Sasanian.
- 644 — 220 diam. × 2.5, but debris at plain level may define a larger area of settlement. Possibly Sasanian. Early/Middle Islamic (–Ilkhanid).
- 645 — 140 diam. × 3, with smaller, lower mounds immediately N across old canal levee. Sasanian–Early Islamic–Samarrian.
- 646 — 100 diam. × 0.4. Sasanian–Early Islamic.
- 647 — 160 NW × 100 × 1. 250 m SSW is a second, 110 diam. × 1. Mainly Parthian, some Sasanian.
- 648 — 100 diam. × 4. Samarrian–Middle/Late Islamic.
- 649 — 240 NW × 100 × 3.5. Middle Islamic (Late ‘Abbasid–Ilkhanid).
- 650 — 150 E × 60 × 1.2, on left bank of old canal bed. Lesser clusters of debris also occur on opposite bank, to the S. Parthian–Sasanian.
- 651 — 140 NNW × 80 × 1.2. Sasanian, probably also some Early Islamic.
- 652 — 140 E × 110 × 1. Sasanian–Early Islamic.
- 653 — 140 diam. × 5.5. Immediately S is a second, 100 diam. × 5.5. A third, smaller and lower, is N of the first. Trace of Uruk. Sasanian–Early Islamic, Late Islamic.
- 654 — Strip settlement along the right bank of an ancient canal, 500 NNW × 30–70 × 0.8. Sasanian, probably a later subphase than that seen at site 655.
- 655 — Strip settlement along the right bank of an ancient canal, 300 NNW × 30–70 × 0.8. Small Uruk occupation. Sasanian.
- 656 Ishān al-Jihariz. 1,200 NW × 350 × 6, al-

though only the central mound reaches this ht. Continuous debris at plain level also extends 250 m E of the main mound to outlying, lower summits. A modest Parthian occupation, mostly Sasanian. Early Islamic debris is confined to the highest, central area. A few 21 cm sq. bricks there may indicate a very minor later continuation, although this cannot be confirmed from the observed surface pottery.

- 657 — 80 diam. × 1. Late Islamic.
- 658 — 80 diam. × 1, directly overlying and hence postdating a major ancient canal branch. Late Islamic.
- 659 — 80 diam × 0.7. Sasanian.
- 660 — 80 diam. × 1. Sasanian–Early Islamic. A few 21 cm sq. bricks may indicate a somewhat later continuation on a small scale.
- 661 — 180 E × 100 × 3.8. Parthian–Sasanian.
- 662 — 40 diam., plain-level debris. 150 m SE is a similar area 80 m diam. The first is Jemdet Nasr, the second Late Islamic.
- 663 — 200 E × 80, the central portion rising to 3.8. Outer limits of site are obscured by dunes, but several smaller mounds occur 300 m SW. Parthian–Sasanian.
- 664 — 160 N × 90 × 1. Sasanian.
- 665 — See sketch map, with ht. of individual mounds shown in m. Achaemenian–Parthian, a minor Sasanian occupation also.



- 666 — 140 diam. × 2.5. The limits of the site are somewhat arbitrary, however, since surface debris extends well beyond the limits of the perceptible slope. Mainly Parthian, Sasanian confined to N end.
- 667 — 100 diam. × 1.2, but with debris at or just above plain level extending several hundred m N and NE. Small Uruk settlement. Ur III–Larsa, Achaemenian. Some Parthian pottery also is present but may derive from graves only; slipper coffins of this date are being exposed above the surface of the site by wind erosion.
- 668 — 300 NE × 140 × 3.5. A second, 200 m SE, is 350 NNE × 200 × 2. Sasanian.
- 669 — 80 diam. × 0.8, although only the central part rises perceptibly above plain level. Sparse debris at plain level extends WNW and ESE. 400 m NNE is a second, 90 diam. × 1.2. Immediately E of the second is a third, 70 diam. × 1.2. Achae-

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- menian-Parthian. Probably the latter period is predominant on the first, the earlier period on the other two.
- 670 — 220 WNW  $\times$  100  $\times$  3; collection was limited owing to wind-laid sand deposits on mound. 600 m NE is a second, 90 diam.  $\times$  2. Adjoining NNE of the second is a third, 100 diam.  $\times$  2.6. Early Islamic-Samaritan. An underlying Sasanian occupation seemed possible at the single mound to the SW, while the pair to the NE probably continued somewhat later than the Samaritan period.
- 671 — 900 ENE  $\times$  300, with continuous debris at plain level and occasional small mounds rising to 2 m. The presence of dunes to the E may obscure a still further extension. Probably small Uruk and Cassite occupations. Mainly Parthian.
- 672 — 140 diam.  $\times$  3. 400 m NNW is a second, 90 diam.  $\times$  3. 300 m NNW of the second is a third, 200 NNW  $\times$  150  $\times$  2.5. The second and third mounds have traces of Cassite, primarily Achaemenian, some Parthian. The first mound has Achaemenian-Parthian also but is primarily Sasanian.
- 673 — 180 N  $\times$  100  $\times$  0.3, although the limits of surface sherd concentration are not well defined. Trace of Uruk. Primarily Old Babylonian, a little Middle Babylonian.
- 674 — 150 NNW  $\times$  110  $\times$  2.2. 300 m S is a second, 100 diam.  $\times$  2. There may be a small, underlying Cassite settlement at the N mound. Both are Sasanian-Early Islamic.
- 675 — 80 diam.  $\times$  2.8, with smaller, lower mounds 80 m NNW and 30 m SSE. Mainly Achaemenian, also a little Parthian-Sasanian.
- 676 — Debris at plain level within an area 400 diam, a mound 110 diam.  $\times$  1 standing near the center. A second mound is 400 m SE, 100 diam.  $\times$  1.2. Sasanian.
- 677 — 104 diam.  $\times$  0.2, partly obscured by wind-blown sand and heavy vegetation. 200 m SSW is a second area of debris, with sparse sherds at plain level within an area perhaps 140 NW  $\times$  80. Slightly farther S is a third, extremely small cluster of debris. Local flooding from the main drainage outlet of the Mussayib irrigation project made this site inaccessible after 1968 visit. Early and/or Middle Uruk.
- 678 — 750 WNW  $\times$  180  $\times$  0.2. Early/Late Uruk.
- 679 — 350 WNW  $\times$  200, nowhere more than very slightly above plain level. A second, about 25 m in diam., is 700 m ESE. Parthian.
- 680 — Low hummocks with sparse pottery, within an area 30 diam. Late Ubaid, Early Uruk.
- 681 — 250 NNW  $\times$  140, rising in small semi-detached mounds on ends to 2 m ht., but mostly 1 m or less. 26 cm sq. bricks observed. Sasanian-Early Islamic.
- 682 — 250 N  $\times$  200  $\times$  4.5. Sasanian-Early/Middle/Late Islamic.
- 683 — 270 NNW  $\times$  120  $\times$  4. Sasanian-Early Islamic, a little Samaritan.
- 684 — 100 NNW  $\times$  50  $\times$  0.4. Sasanian.
- 685 — 120 diam.  $\times$  1.2. 200 m S is a second, 70 NW  $\times$  50  $\times$  0.6. Parthian.
- 686 — Location is approximately that of "Imām Nowāja" in Selby, Collingwood, and Bewsher 1885. 30 diam.  $\times$  6, a steep conical mound largely composed of fallen bricks (30 cm sq.) and mortar; the remains of plastered walls are visible near summit. A buttressed wall extends NE, possibly functioning as a kind of control facility across an ancient canal leading in the direction of Zibliyat. Early Islamic pottery is not confined to the small mound but occurs on the surrounding plain surface also.
- 687 — 120 diam.  $\times$  4, with shallow brick-robbing pits and many fragments of large bricks and mortar. A larger, lower mound of the same character also occurs 200 m N. Sasanian, some Early Islamic.
- 688 — 280 E  $\times$  80  $\times$  0.8. Parthian.
- 689 — 140 NNW  $\times$  110  $\times$  1. Achaemenian-Parthian.
- 690 — 200 ENE  $\times$  120  $\times$  1.6. Sasanian.
- 691 — 350 NW  $\times$  120  $\times$  3.5. Trace of Uruk. Achaemenian-Parthian.
- 692 — 450 NW  $\times$  140  $\times$  6.5. Adjacent NNE is a second mound, 180 diam.  $\times$  2. Trace of Early Dynastic I. There is evidence of a small Larsa-Old Babylonian-Cassite settlement along the SW side and at the SE end of the main mound. The major occupation is Achaemenian-Parthian.
- 693 — At least 300 diam.  $\times$  5, bisected by an old canal course from NW. Full size may be obscured by enveloping dunes. 400 m WNW is a second, 180 diam.  $\times$  3.5. Parthian.
- 694 — 210 diam.  $\times$  0.8. Parthian.
- 695 — 140 NW  $\times$  80  $\times$  5. There is a small, low outlying mound immediately N. Achaemenian-Parthian.
- 696 — 280 diam.  $\times$  2.8. Sasanian.
- 697 — 240 diam.  $\times$  2.6, with a smaller, lower mound adjacent NNW. Late Islamic.
- 698 — 180 diam.  $\times$  2. Sasanian.
- 699 — Irregularly outlined, but about 800 ENE  $\times$  350. E side rises abruptly to a fairly uniform elevation of 4.5 m with much broken brick and mortar, possibly indicating a walled settlement. W, probably across an old canal bed, mounds are lower and more dispersed, but debris is continuous. Sasanian.

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- 700 Zibliyat. The prominent ruined tower known by this name lies at the N end of the ruins of a very substantial urban area. As outlined on the map, the larger ruins extend irregularly over more than 2,000 N × 800. Most of this area is elevated 1–2 m above plain level, and there are many prominent mounds rising 4–6 m. Much fallen brick and mortar, as well as some large standing walls in place, can be observed on the surface of these mounds; except around the tower at the N end the brick is largely or exclusively 34 cm sq. and tends to be uniformly reddish fired. This suggests that some of the major summits have very large buildings at their core. S of the tower and near the W edge of the city is a specialized glassworking area that perhaps centers on a mound 70 diam. × 4.5 where there is much melted glass and slag from kilns. What remains of the tower is apparently little more than its mud-brick core, with some interior division into rooms implied by suggestions of arched roofing in exposed profiles. There are many 30 cm sq. bricks on the slope around its base, however, that presumably have fallen from its original facing. This appears to indicate that the tower was not contemporary with the major occupation of the site (cf. Layard 1897, p. 596). Parthian debris occurs sparsely but widely, perhaps most concentrated in the SW quadrant of the city but not predominating even there. The major occupation, surely associated with the 34 cm sq. bricks that are profuse in all parts of the urban area, was Sasanian. Early Islamic debris is confined to the N end of the site, and sherds of this date are relatively abundant around the ruined tower there. SW of the tower and semidetached from the apparent W limits of the main urban area is a very small settlement that continued into Middle and even Late Islamic times.
- Since I wrote the material above, I have been informed by J. N. Postgate that a radiocarbon determination has recently been made on reeds taken from the Zibliyat tower. Designated as sample BM-1416, the measurement was  $1102 \pm 43$  B.P. (A.D. 848). Recalibrated for natural radiocarbon variation according to the calibration tables of Clark (1975), this is equivalent to  $1070 \pm 70$  B.P. or ca. A.D. 880 (Postgate, pers. comm.).
- 701 — 190 E × 80 × 1.5, bisected by a former canal bed. A smaller mound is adjacent NW. Sasanian–Early Islamic.
- 702 — 250 NW × 140 × 4. Early/Middle/Late Islamic.
- 703 — 280 NNW × 160 × 1.3. Sasanian.
- 704 — 350 N × 200 × 2.4. Sasanian, also a small Recent occupation.
- 705 — 90 NW × 50 × 0.9. Achaemenian–Parthian.
- 706 — 100 NW × 60 × 2. Possibly a small, underlying Uruk site. Primarily Cassite, although an antecedent Larsa–Old Babylonian occupation is also possible.
- 707 — 180 NE × 80 × 2.4. Early Islamic–Samaran.
- 708 — 150 diam. × 2. Sasanian–Early Islamic–Samaran.
- 709 — 1,000 WNW × 160 × 1.5. There are several small hummocks 200 m N. Sasanian–Early Islamic.
- 710 — 180 diam × 2.8, consisting of three summits surrounding a central low area. 80 m WNW is a second, 80 diam. × 1.6. At plain level 150 m N of main mound is a Parthian cemetery that is being exposed by wind erosion. The mound is Sasanian–Early Islamic–Samaran.
- 711 — 180 diam. × 2, but with debris at plain level extending over a much larger area. Probably a small Uruk occupation. Mainly Sasanian.
- 712 — 300 WNW × 90 × 1.5. Early/Middle/Late Islamic.
- 713 — 140 diam. × 2.8. Ur III–Larsa.
- 714 — A very small, apparently mixed lot of surface debris, perhaps thrown up in the spoil banks of a much later canal that has itself now been virtually obliterated by wind erosion. Trace of Uruk. Larsa–Old Babylonian. Trace of Cassite.
- 715 — Low, scattered hummocks and surface debris within an area 180 diam. Even in the absence of any perceptible elevation of this site, it seems to consist at least in part of a cemetery that is being exposed by wind erosion. Ur III–Larsa.
- 716 Tūlūl al-Ahwal. The number on base map adjoins the S and E mounds of a group of four outlining a rough rectangle whose long axis is NW. While the SW and SE sides of this rectangle are oriented approximately as indicated, however, the other two sides are slightly divergent. Nor are the mounds of equal size. The most prominent, a steep-sided cone rising 8–10 m, is on the E. The S mound is only slightly smaller, but the W and N mounds are only half as high and have much smaller volumes. Presumably all were contemporaneous in what appears to have been a single phase of artificial construction for each of them, although no sherds could be found that were definitely associated with their construction or use. While there is a small, sparse settlement around the foot of the E mound, there can be no certainty that it was coeval with the mound itself. The settlement referred to was Sasanian, and this may be taken provisionally as the date for the

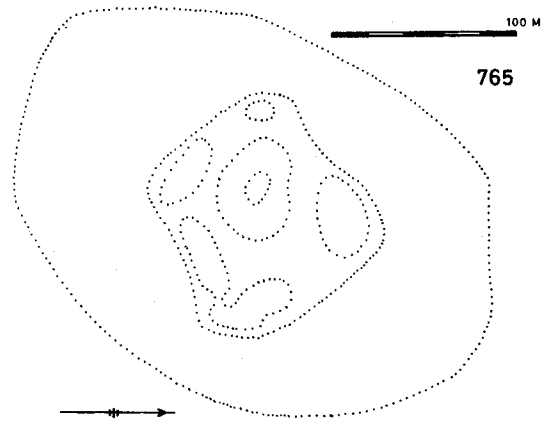
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group of four mounds. Artificial mounds of this general type occur elsewhere in southern Iraq (e.g., sites 164 and 170 in the Warka survey), and a Parthian or Sasanian dating seems reasonable for them.

- 717 — 250 NW  $\times$  120  $\times$  1.9, rising to summits of this ht. at both ends rather than in center. Sasanian–Early Islamic.
- 718 — 260 NW  $\times$  90  $\times$  2. Continuous debris at plain level extends 140 m SE to a second mound, 130 E  $\times$  60  $\times$  1. Parthian.
- 719 — 360 WNW  $\times$  140  $\times$  5. Sasanian–Early/Middle/Late Islamic.
- 720 — 300 diam.  $\times$  4. Trace of Uruk. Larsa–Old Babylonian–Cassite, some Parthian.
- 721 — A very small, low site bounded by canal beds and perhaps consisting only of debris secondarily thrown up in spoil banks. Cassite.
- 722 — 80 NW  $\times$  20  $\times$  0.2. Flanked on both sides by slight depressions suggesting old canal beds, perhaps indicating that the cultural debris was secondarily thrown up in spoil banks. Very sparse additional debris occurs across one of these beds, to the NE. On the mound between the beds, Early Uruk and Ur III–Larsa. To the NE are a few sherds of Jemdet Nasr or possibly Early Dynastic date.
- 723 — 90 diam  $\times$  0.3. Sasanian.
- 724 — 200 NW  $\times$  80  $\times$  1.3. Parthian.
- 725 — 300 NW  $\times$  80  $\times$  2. Sasanian–Early Islamic.
- 726 Tell Abū Sarīfa. See account of site and small-scale soundings there in 1968 (Adams 1970). Parthian–Sasanian–Early/Middle Islamic.
- 727 — 130 diam.  $\times$  3. 30 m E is a second, 120 diam  $\times$  2. Debris at plain level, coeval with the mounds, occupies a surrounding area of at least 1,000 E  $\times$  500. While fairly dense in places, however, the debris does not seem to reflect a continuous settlement with the mounds as a nucleus. Parthian. Three coins could be provisionally identified: A.D. 106, probable Parthian, probable Sasanian.
- 728 — 120 diam.  $\times$  1.5. 200 m SW is a second, 240 NW  $\times$  100  $\times$  1. Sasanian, possibly also Early Islamic.
- 729 — 250 E  $\times$  120  $\times$  3, although enveloping dunes may conceal a somewhat larger size. Sasanian–Early Islamic.
- 730 — 1,000 NW  $\times$  600, rising to 4.5 m near N end. There are many other mounds within the complex of only slightly lesser ht. The site is entirely enclosed and partly covered by dunes, but from what can be seen it appears to represent a single, nucleated urban center. Near the S end there is an open area that may represent a large court, with several brick and mortar columns that have fallen (and perhaps been partly carried away). Possibly these columns originally outlined a monumental gateway; there are many small fragments of architectural ornamentation in stucco in this vicinity. Most of the site is Achaemenian–Parthian, although settlement at the N end continued into the Sasanian period on a small scale. A small hoard of corroded copper coins found near the S end included one that can probably be assigned to Antiochus IV (175–63 B.C.), and two that can only be identified to the extent that they appear Parthian.
- 731 — 180 diam.  $\times$  0.2. Achaemenian–Parthian.
- 732 — 100 diam., sparse pottery at plain level. Sasanian.
- 733 — 120 diam.  $\times$  0.2. Sasanian.
- 734 — 90 NNW  $\times$  70, hummocks rising to 0.2. 100 m WNW are a few additional, scattered hummocks of debris. The larger area is Old Babylonian–Cassite, while the scattered hummocks WNW are Middle–Neo-Babylonian.
- 735 — 40 diam., hummocks rising to 0.2. Sasanian.
- 736 — An enclosing ring, in places a double ring, of sherds at plain level, 40 diam. Possibly the sherds were inclusions in mud-brick walls that have been destroyed by wind erosion, suggesting an isolated building like a khan (caravanserai) or military post. Parthian.
- 737 — 80 diam.  $\times$  0.1, with a second, 70 diam.  $\times$  0.1, 300 m E. Uruk.
- 738 — 110 diam.  $\times$  1.6. Uruk. Mainly Cassite–Middle Babylonian, perhaps a minor Achaemenian–Parthian occupation. Sasanian sherds were not observed on the mound but are found dispersed on the surrounding plain.
- 739 — Perhaps 120 diam  $\times$  0.4, but limits of site are difficult to define. Parthian.
- 740 — 250 diam.  $\times$  0.8. Widespread but sparse sherds indicate an Early/Middle Uruk occupation. Mainly Cassite–Middle Babylonian. Also some Parthian–Sasanian.
- 741 — 140 diam.  $\times$  1, immediately SSE of 740. Parthian.
- 742 — 220 NE  $\times$  100  $\times$  3, with small outliers NE and E. Immediately SSW is another, 160 diam.  $\times$  2.5. Early Islamic–Samaritan, possibly continuing somewhat later.
- 743 — 100 NW  $\times$  60  $\times$  1, largely surrounded by dunes. 200 m SW is a second, 170 diam.  $\times$  0.7. Immediately SSE of the second mound and 100 m SSW of the first is a third, 140 diam.  $\times$  0.3, with sparse pottery. The low mound with sparse pottery is Early Uruk. The other two are Sasanian.
- 744 — 150 diam., plain level. Another area of debris 300 m NW is perhaps 120 diam. Pottery

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- is relatively sparse, particularly on the latter, so that site limits are hard to define. Early Uruk.
- 745 — 80 diam.  $\times$  0.6, with a few higher hummocks of debris. Uruk, Cassite, very limited Parthian.
- 746 — 280 NE  $\times$  50  $\times$  0.2, either a narrow strip of settlement along a canal or merely debris thrown up in later canal spoil banks. Akkadian-Larsa.
- 747 — 120 diam.  $\times$  0.8. Middle/Neo-Babylonian.
- 748 — 90 diam.  $\times$  0.4, with a few additional hummocks of debris NW and N. Possible Late Uruk. Jemdet Nasr. Possible, but at best very limited, Ur III-Larsa. A few late graves that can be only provisionally assigned to the long span between Middle Babylonian and Parthian.
- 749 — 240 NW  $\times$  130  $\times$  2.2. 150 m W is a second area of settlement, 200 NW  $\times$  80, that is mostly below 0.8 but that rises in a few hummocks to 1.5. A small Uruk settlement probably underlies the W part of the site. However, both mounds are mainly Cassite.
- 750 — 160 E  $\times$  130  $\times$  1.8. 150 m ENE is a second, 90 diam.  $\times$  0.8. Bricks 23 cm sq. Middle Islamic.
- 751 — 80 diam  $\times$  0.3. Sasanian.
- 752 — 120 diam.  $\times$  0.8. Middle Islamic, coeval with site 750.
- 753 — 250 E  $\times$  170  $\times$  2.2. 150 m NE is a second. 80 diam.  $\times$  2. Main mound primarily Achaemenian but continuing into Parthian. Smaller mound is mainly Seleucid-Parthian.
- 754 — 160 E  $\times$  80  $\times$  1.9. Sasanian.
- 755 — 140 diam.  $\times$  2. Sasanian.
- 756 — Main axis of the site follows the left bank of the Shatt al-Nil for 400 m, with a perpendicular arm extending NNE from the center for 350 m. Mostly low, but rising to 2.2 m near center. On opposite bank is a mound 220 NW  $\times$  120  $\times$  1.4, while farther downstream is a third mound 80 diam.  $\times$  2. early Islamic, at best limited Samar-ran.
- 757 — 220 diam.  $\times$  0.8. Samarran, possibly continuing somewhat later.
- 758 — 110 diam.  $\times$  2. 200 m SSE is an additional area of debris at plain level, ill-defined but large. The debris at plain level is primarily Neo-Babylonian-Achaemenian, perhaps continuing into Seleucid-Parthian. The mound may begin in Achaemenian, but it is primarily Seleucid-Parthian.
- 759 — Part of Tūlūl Sutail. 250 E  $\times$  180  $\times$  3. Parthian-Sasanian.
- 760 — Part of Tūlūl Sutail. 700 E  $\times$  500  $\times$  4.5, although only a central mound 100 m diam. reaches this ht. Probably also Sasanian, but mainly Early Islamic-Samarran.
- 761 — Two mounds 300 m apart NNE-SSW, each about 130 diam.  $\times$  3. Parthian.
- 762 — 280 NW  $\times$  130  $\times$  1.5, with debris at plain level extending farther NW. Sasanian.
- 763 — 160 diam.  $\times$  1. 250 m SW is a second, 110 diam.  $\times$  0.8. Sasanian-Early Islamic.
- 764 — 380 NW  $\times$  240. Three semidetached sum-mits, the highest of 4.5 m to the SE, occur within this area, while the greater part of it consists only of low debris. The highest mound is mainly Parthian, the others mainly Sasanian. Three incantation bowls were recovered together on the latter.
- 765 — 280 NE  $\times$  190  $\times$  1.3. See sketch map. For fuller description see Redman 1971. Early/Middle Uruk.



- 766 — 120 diam.  $\times$  2.6, with an area of equal size at 0.5 elevation forming an apron that en-closes the entire NE half of the mound's peri-meter. 150 m SW is a second mound, 170 NNW  $\times$  100  $\times$  1.6. Achaemenian-Parthian.
- 767 — 90 diam.  $\times$  2. Sasanian-Early Islamic.
- 768 — Part of Tūlūl Sutail. 300 diam.  $\times$  6. Other, smaller mounds tail off SW. Widely scattered sherds hint at an underlying Uruk occupation. Sasanian.
- 769 — 150 N  $\times$  80  $\times$  2. Early Islamic-Samarran, Late Islamic-Recent.
- 770 — 140 diam.  $\times$  2, with low debris tailing off NW for 200 m. Ur III-Larsa-Old Babylonian.
- 771 — 140 diam.  $\times$  2.5. Middle Babylonian.
- 772 — Low hummocks of debris within an area perhaps 80 diam., but the limits are ill defined be-cause of surrounding dunes. Cassite, Sasanian.
- 773 — 120 NW  $\times$  60  $\times$  1.5. Immediately NW is a second, 120 diam.  $\times$  0.8. To the S, across the old Shatt al-Nil canal from the second, is a third, 130 NW  $\times$  40  $\times$  0.8. Early Islamic.
- 774 — 70 diam.  $\times$  1. Sasanian-Early Islamic.
- 775 — 170 NNE  $\times$  50  $\times$  0.6. Early Islamic-Samarran.

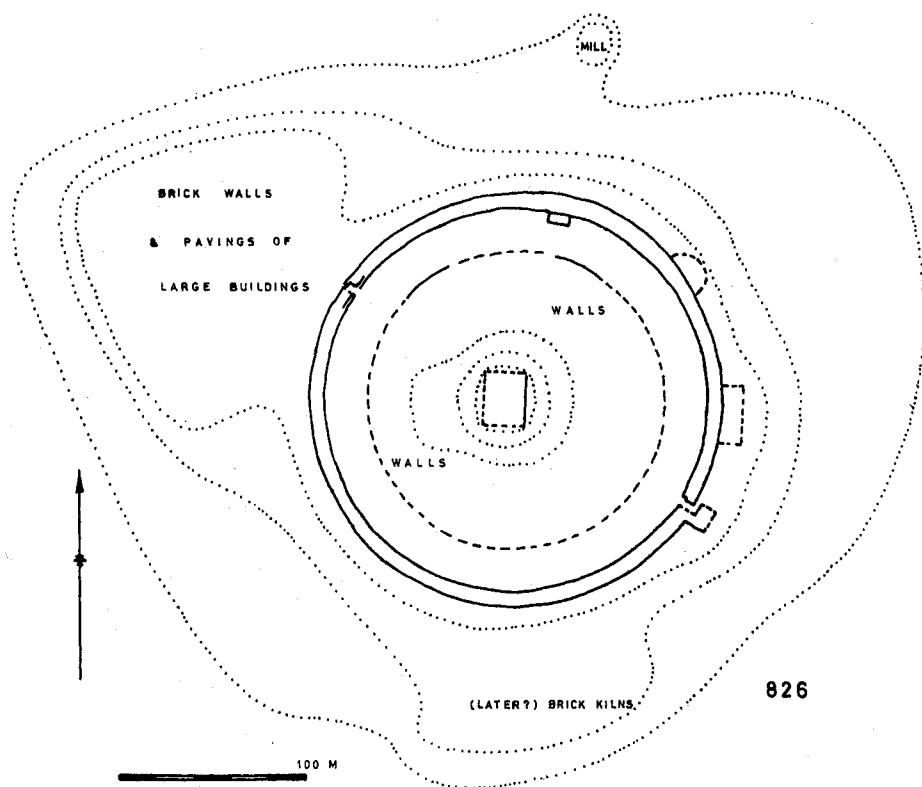
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- 776 — 180 NNW  $\times$  120  $\times$  0.8. Possibly Achaemenian, mainly Seleucid-Parthian.
- 777 — 130 NE  $\times$  70  $\times$  1.3. A smaller mound lies 100 m SW along an old levee, and other still smaller hummocks of debris continue farther in this direction. Sasanian-Early Islamic.
- 778 — 140 diam.  $\times$  2.3. 90 m NE is a second, 90 diam.  $\times$  0.1. Two much smaller mounds are evenly spaced SW. Probably a small, underlying Uruk site. Sasanian-Early Islamic, Late Islamic-Recent.
- 779 — 80 diam.  $\times$  0.5. 50 m NE is a second, 40 diam.  $\times$  0.3. Mainly Sasanian, some Early Islamic.
- 780 — 200 NW  $\times$  100  $\times$  2.4. 200 m NW is a second, 100 diam.  $\times$  0.6, with a still smaller mound immediately SW. Sasanian-Early Islamic.
- 781 — 700 WNW  $\times$  180  $\times$  0.2, partly dune-covered. Early/Middle Uruk, Jemdet Nasr, possibly Early Dynastic I. Limited Akkadian. Mainly Larsa-Old Babylonian.
- 782 — 220 ENE  $\times$  80  $\times$  2. A small underlying Uruk settlement. Possibly Sasanian. Early Islamic. Mainly Samarran. Some Recent.
- 783 — 120 diam.  $\times$  0.3. Adjacent WSW is an area of debris at plain level, 30 m in diam. The WSW debris is Uruk and Larsa-Old Babylonian-Cassite. The low mound is Early Islamic.
- 784 — 120 diam.  $\times$  1.6. Late Islamic.
- 785 — 220 ENE  $\times$  80  $\times$  2. Late Islamic.
- 786 — Scattered low hummocks within an area 80 diam. Debris is sparse except on the hummocks. Middle Uruk doubtful, mainly Late Uruk. Trace of Jemdet Nasr.
- 787 — 140 diam.  $\times$  3, with lower mounds extending almost continuously for 220 m farther to the NNE. Achaemenian-Parthian.
- 788 — 180 NNE  $\times$  70  $\times$  1.8. Surface obscured by wind-laid sand. Sasanian, probably also Early Islamic.
- 789 — 160 diam.  $\times$  0.5. Trace of Uruk. Sasanian.
- 790 — 250 NE  $\times$  220  $\times$  0.3. Intensive collection made within a circle of 5 m radius, center. Middle/Late Uruk, the former probably preponderant. There is also a little Sasanian-Early Islamic pottery that may not represent a primary occupation.
- 791 — Main mound 170 diam.  $\times$  3. 100 m ENE is a second, 200  $\times$  70  $\times$  2.6, forming a shallow C-shaped ridge open to the NE. 400 m WSW is a third, 80 diam.  $\times$  1.8. Sasanian.
- 792 — 260 diam.  $\times$  0.3. Intensive collection made in circle, 5 m radius, center. Several apparent pottery kilns were noted in the central part of the site. Early Uruk.
- 793 — 60 diam., very sparse debris at plain level. Early Uruk.
- 794 — 90 WNW  $\times$  50  $\times$  0.5. Adjacent SE is a mound 70 NW  $\times$  30  $\times$  0.2. Trace of Cassite. Primarily Middle Babylonian. There are Parthian graves on both mounds that appear to trail off SE.
- 795 — Plain-level debris, a few low hummocks within an area 50 diam. Cassite.
- 796 Part of Tūlūl Sutaīl. Scattered mounds within an area 400 diam., some rising to 3 m ht. Bricks 24, 25, and 29 cm sq. Early Islamic, possibly continuing into the Samarran period.
- 797 — 280 NW  $\times$  100  $\times$  2.3. Trace of Uruk. Achaemenian-Parthian.
- 798 — 600 E  $\times$  450, mostly low but rising to a 3.5 m summit. Mainly Sasanian, less Parthian. The Early Islamic occupation was largely confined to the most elevated, central portion of the site. There is also a much earlier settlement on the ESE end of site, lightly overlain by later debris. Its original size can only be guessed at 5 ha. Probably Jemdet Nasr, mainly Early Dynastic I, some later Early Dynastic.
- 799 — 120 diam.  $\times$  3. 250 m E is a second, smaller. Sasanian.
- 800 — 80 diam.  $\times$  0.8. Sasanian.
- 801 — 450 NW  $\times$  250  $\times$  5, rising to this ht. only near W end. Mound is Neo-Babylonian-Parthian. Sherds suggesting a small Early Dynastic I occupation are found in the bed of the Shatt al-Nīl immediately SW.
- 802 — 90 diam.  $\times$  1.4. Indication of an underlying Early/Middle Uruk occupation. Mostly Cassite, probably continuing into Neo-Babylonian.
- 803 — 70 diam.  $\times$  0.8. A still smaller mound lies 50 m NW. Probably a small, underlying Uruk settlement. Some Sasanian. Mainly Late Islamic-Recent.
- 804 — 130 diam., plain level. Sparse surface pottery necessitated an essentially exhaustive collection of diagnostic types from the entire site in order to establish an adequate basis for dating. Early Uruk.
- 805 — 70 diam. Surface pottery is sparse everywhere, and only relatively more plentiful on a few low hummocks apparently representing kilns. The collection essentially exhausted the diagnostic types to be observed on the site, save that the number of beveled-rim bowl sherds could have been at least doubled by including progressively smaller sherds. Late Uruk.
- 806 — 240 E  $\times$  140  $\times$  3.2. Parthian.
- 807 — 70 diam.  $\times$  2.2. Ur III-Larsa.
- 808 — 180 diam.  $\times$  2, but with debris tailing off NNW. Samarran, also some Recent. (A sgraffiato



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- sherd from this site is illustrated in Adams 1970, fig. 16h.)
- 809 — 300 E  $\times$  180  $\times$  0.2. Sasanian.
- 810 — 40 diam.  $\times$  0.3. S across old canal from NNW is a second, perhaps 100 diam.  $\times$  0.1. Late Islamic-Recent.
- 811 — 170 E  $\times$  90  $\times$  0.8, with lower, dispersed hummocks of debris extending at least 500 m farther E. Early Islamic-Samarra.
- 812 — 120 diam.  $\times$  0.8. Parthian.
- 813 — 90 diam.  $\times$  1. 200 m E is a second, 40 diam.  $\times$  0.2. The main mound is Samarra-Middle Islamic, the smaller one Samarra only.
- 814 — 140 diam.  $\times$  1. Sasanian, limited Early Islamic.
- 815 — 130 WNW  $\times$  70  $\times$  1. Ur III-Larsa.
- 816 — 140 diam.  $\times$  0.8. Sasanian.
- 817 — 200 NW  $\times$  120  $\times$  0.8. Achaemenian-Parthian.
- 818 — 260 NW  $\times$  140  $\times$  2, surmounted by several high dunes. Debris at plain level extends NW almost to 817, at least 500 m, but is too sparse to represent a continuous settlement for this distance. There is an Early/Middle Uruk occupation here, although it could not be localized. Mainly Larsa-Old Babylonian-Cassite.
- 819 — 90 diam.  $\times$  1. Early Islamic-Samarra, probably continuing a little later.
- 820 — Sparse, low hummocks within an area 120 m in diam. Middle-Neo-Babylonian.
- 821 — 70 diam.  $\times$  0.6. Small underlying Uruk settlement. Sasanian-Early Islamic.
- 822 — 110 N  $\times$  60  $\times$  1.4. Cassite-Middle Babylonian.
- 823 — 240 E  $\times$  120  $\times$  2.5. Sasanian-Early Islamic.
- 824 — 120 diam.  $\times$  0.4. Early Uruk, Larsa-Old Babylonian, very limited Cassite.
- 825 — 110 diam.  $\times$  2. Adjoining SSW is a second, 90 diam.  $\times$  1.8 Sasanian.
- 826 Tell al-Arsan. This impressive site can be divided into two parts. To the SE is a very well preserved circular citadel 220 m in diam. Its outer wall, built entirely of baked brick 30 cm sq., can be followed for virtually the entire circumference. In addition, there are outer structures at intervals that suggest protective towers, gates, and perhaps even a moat. Within the circumvallation are numerous wall footings, also of 29-30 cm sq. brick. In the center is a mound about 60 m in diam. that is superimposed on the larger circular platform enclosed by the wall, reaching a maximum elevation of about 6 m. On its summit are traces of a possible rectangular building. Immediately NW of the larger, circular part of the site is a lower area with numerous, well-preserved wall footings of



- 29–30 cm sq. brack, suggesting that large buildings could be planned with very superficial trenching. There are also areas with thin walls at irregular angles suggesting small private houses. See sketch plan. The small mound within the circular wall is primarily of Uruk date, although Cassite pottery is present in quantities around its foot. Sparse Cassite debris occurs elsewhere in the circular citadel as well, but not in the lower settlement to the NW. The main occupation was Parthian, possibly continuing briefly into the Sasanian period. One coin can be attributed to Osroes, ca. A.D. 110. Unfortunately, this fine site is now isolated for much of the year by marshes (and residual salt flats) created by the outflow from the Mussayib main drainage canal.
- 827 — 70 diam.  $\times$  2.3. Pottery is sparse; much of mound consists of brick-kiln slag and cinders of uncertain date. Probably to be assigned to the Cassite–Middle/Neo-Babylonian range.
- 828 — 220 diam.  $\times$  4. A second, 140 diam.  $\times$  2, is 100 m SSE. Larsa–Old Babylonian–Cassite.
- 829 — 120 WNW  $\times$  25  $\times$  0.1. Early/Middle Uruk.
- 830 — Obscured by dunes, but at least 450 NNE  $\times$  250. SSW end 5 m high, NNE end lower. Achaemenian–Parthian.
- 831 — 300 diam.  $\times$  2.8. Very extensive, although generally small and fairly shallow, pitting of the surface of this mound occurred between my 1968 and 1975 visits. One effect of this pitting is to obscure almost completely the scatter of surface sherds needed for dating. A substantial Early Uruk settlement. Mainly Ur III–Larsa. Reduced Achaemenian–Parthian occupation.
- 832 — 350 NE  $\times$  220  $\times$  2.6. The pitting that almost continuously covers site 831, only 200 m SE, does not (yet) extend to this mound. Early Uruk is largely limited to SE end. Major occupation Ur III–Larsa. NE end continues into the Old Babylonian period.
- 833 — Two small mounds, each about 100 diam.  $\times$  2.5. One is immediately SW of site 832, the second 100 m farther S. A third, about 1,000 m directly S of the two, is 130 NNW  $\times$  40  $\times$  0.6. The third, smallest mound is Ur III–Larsa. The first, closest to site 832, is Larsa–Old Babylonian–Cassite. The other mound is Sasanian.
- 834 — 250 diam.  $\times$  6. Outlying mounds 30 m WNW (110 diam.  $\times$  0.8) and 100 m SW. Much debris also at plain level, probably extending at least 350 m ESE, but this is partly obscured by drifting sand and dunes. Mainly Larsa–Old Babylonian–Cassite. Limited Neo-Babylonian–Achaemenian–Parthian. Sasanian, in addition to the early material, occurs only on WNW outlier.
- 835 — 170 diam.  $\times$  1.2. Early/Middle Uruk, Cassite–Middle Babylonian.
- 836 Tell Dauran. 180 N  $\times$  100  $\times$  6.5. A prominent, steep-sided, flattopped landmark. Achaemenian–Parthian.
- 837 — 120 diam., plain level. Sparse surface pottery made necessary a fairly exhaustive collection from the entire site rather than the selection of a sample area. Early Uruk. Numerous Sasanian–Early Islamic sherds were assumed not to represent a real occupation but to be strays from nearby site 838.
- 838 — 200 NE  $\times$  90  $\times$  2.8. 40 m NW is a second, 180 diam.  $\times$  2.5. Small outliers are adjacent NE and 400 m SW of the first. Two other small mounds, each about 80 diam.  $\times$  2.4, form an E–W line about 150 m E of the first. At the second mound there were small Uruk, Cassite occupations. Mainly Middle/Neo-Babylonian. The remainder of the group is Sasanian, with a probably reduced Early Islamic occupation also, and some of this later debris naturally occurs on the early mound as well.
- 839 — 150 NE  $\times$  80  $\times$  2.5. Sasanian–Early Islamic.
- 840 — 100 diam.  $\times$  0.8. Sasanian.
- 841 — 160 diam.  $\times$  4.5. Neo-Babylonian–Achaemenian, possibly continuing somewhat later.
- 842 — 750 NE  $\times$  200  $\times$  2.8. 200 m SW is a second mound, 280 diam.  $\times$  2.3, the elevated part of the mound forming a c-shaped ring open to the SW. Sasanian.
- 843 — 80 diam.  $\times$  2, with lower and smaller mounds trailing off NW and SE along old levee. Sasanian–Early Islamic.
- 844 — 60 diam., low. Ur III–Larsa.
- 845 — 320 NW  $\times$  250  $\times$  3. Early Uruk, Larsa–Old Babylonian–Cassite, Sasanian.
- 846 — 160 diam.  $\times$  0.8. 300 m NNW is a second, 120 diam.  $\times$  0.6. Sasanian.
- 847 — 450 diam.  $\times$  4, dune-covered. Sasanian–Early Islamic.
- 848 Tell Abū Dhuwārī, 950 NW  $\times$  200  $\times$  3.5. Additional smaller mounds, the closest 150 diam.  $\times$  2.2, and plain-level debris extend E for a considerable distance. As at site 1013 nearby, there is extensive surface-level architecture at this site that could be easily mapped from a low-level air photograph. Bricks in the exposed (foundation?) courses are mainly 21 and 23 cm sq., with a few broken and reused 25 cm bricks used as wall interior fill rather than facing. Adjoining houses with relatively small rooms seem to follow the central axis

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- of the site for its entire NW end, perhaps hinting at a street layout. Rooms and courts are seemingly larger and walls thicker to the SE. Nothing unequivocally Sasanian seen. Early Islamic apparently uniform in distribution over the entire site, and perceptibly more common than at Nippur. This suggests a later termination than at Nippur, possibly continuing into the Samarran period.
- 849 — 30 diam.  $\times$  0.8. Sasanian–Early Islamic.
- 850 — 110 E  $\times$  40  $\times$  0.8. Probable Sasanian. Early Islamic.
- 851 — 180 E  $\times$  100  $\times$  2. Sasanian, possibly also Early Islamic.
- 852 — 240 E  $\times$  130  $\times$  1.2. Probable Sasanian. Mainly Early Islamic, some Samarran.
- 853 — 180 diam.  $\times$  2.2, with a smaller mound immediately E. Uruk, Sasanian–Early Islamic–Samarran.
- 854 — 300 WNW  $\times$  220  $\times$  2. 50 m ESE is a second, 180 diam.  $\times$  1.2. Probably there is a small, underlying Uruk settlement here. The first mound is Cassite–Middle/Neo-Babylonian, the second similar but apparently without Cassite.
- 855 — 220 NW  $\times$  120  $\times$  1. Possible Sasanian. Early Islamic.
- 856 — 140 E.  $\times$  70  $\times$  0.8. Probable Sasanian. Mainly Early Islamic, some Samarran.
- 857 — 150 diam.  $\times$  1.5. Sasanian.
- 858 Tell Abū ‘Allma. 450 E  $\times$  200  $\times$  5. Trace of Uruk. Cassite–Parthian.
- 859 — 230 NNW  $\times$  170  $\times$  2.3. 200 m NE is a small, contemporary outlier, 60 diam.  $\times$  0.4. Bricks 22 cm sq. Sasanian–Early Islamic–Samarran–probably later.
- 860 — 140 diam.  $\times$  2, with a small conical mound at SSE end rising to 4.2 m. There is a small outlier 100 m WSW. Sasanian.
- 861 — 260 NNW  $\times$  170  $\times$  1. Larsa–Old Babylonian–Cassite–Middle Babylonian.
- 862 — 110 NE  $\times$  30  $\times$  0.3. 200 m NE is a second, 110 NE  $\times$  60  $\times$  0.4. Sasanian–Early Islamic.
- 863 — 200 NE  $\times$  140  $\times$  2. 200 m farther NE is a second, 300 NE  $\times$  90  $\times$  1. Immediately N of second is a third, 90 diam.  $\times$  1. Sasanian–Early Islamic.
- 864 — 90 diam.  $\times$  0.8. Sasanian.
- 865 — 160 NW  $\times$  100  $\times$  2.2. Some Cassite, mainly Neo-Babylonian–Achaemenian.
- 866 — 130 diam.  $\times$  2. Rare Parthian. Mainly Sasanian.
- 867 — 90 diam.  $\times$  4.5. Neo-Babylonian–Achaemenian–Parthian.
- 868 — 150 diam.  $\times$  1.8, with low hummocks of debris continuing SW along old levee. Sasanian–Early Islamic.
- 869 — 180 diam.  $\times$  4. Rare Larsa. Mainly Old Babylonian–Cassite. Rare Neo-Babylonian.
- 870 — 150 ENE  $\times$  120  $\times$  2. Parthian.
- 871 Ishān Abū Basūr al-Sharqi. 250 diam.  $\times$  5.5. Akkadian–Larsa, Achaemenian–Parthian, sparse Sasanian.
- 872 — 120 diam.  $\times$  2.8, but with a wide, low strip of debris extending 350 m NE from main mound. Achaemenian–Parthian. Sasanian pottery is localized on NE end of low strip.
- 873 — 180 diam.  $\times$  5. Parthian–Sasanian–Early Islamic.
- 874 — 200 diam.  $\times$  4.5. Parthian–Sasanian–Early Islamic.
- 875 Ishān Abū Basūr al-Gharbi. 500 NW  $\times$  350  $\times$  6. Rare Cassite–Middle/Neo-Babylonian. Mainly Achaemenian–Parthian.
- 876 — 220 WNW  $\times$  120  $\times$  2.5. Trace of Uruk. Sasanian.
- 877 Tell Abū Dhaba’. From Inspectorate of Surveys records, file 54, register 1616. Recorded as Neo-Babylonian–Parthian.
- 878 Tell Abū Shejayr. From Inspectorate of Surveys records, file 10, register 1465. Recorded as Neo-Babylonian–Parthian, Islamic.
- 879 Tell Abū Hamīs. From Inspectorate of Surveys records, file 10, register 1465. Recorded as Neo-Babylonian–Parthian, Islamic.
- 880 Tell Abū Gōda. From Inspectorate of Surveys records, file 35, register 1587. Recorded as Neo-Babylonian–Parthian.
- 881 Tell al-Dubaysīya. From Inspectorate of Surveys records, file 29, register 1587. Recorded as Islamic.
- 882 Tell Bismaya. 680 E  $\times$  400  $\times$  10. Seleucid–Parthian–Sasanian.
- 883 Tell Tuwaym. From Inspectorate of Surveys records, file 47, register 1587. Recorded as Parthian.
- 884 Tell Abū Kelb. From Inspectorate of Surveys records, file 40, register 1587. Recorded as Neo-Babylonian–Parthian.
- 885 Ishān Abū Shūra. From Inspectorate of Surveys records, file 30, register 1587. Recorded as Islamic.
- 886 Tell al-Jela’a. From Inspectorate of Surveys records, file 294, register 440. Recorded as Islamic.
- 887 Tell al-Baghal. From Inspectorate of Surveys records, file 291, register 440. No dating assessment available.
- 888 Tell al-Haytaniya. From Inspectorate of Surveys records, file 286, register 440. Recorded as Islamic.
- 889 Tell Khesayn al-Kabir. From Inspectorate of Surveys records, file 289, register 440. Recorded as Sasanian.
- 890 Tell Mayyid. 150 diam.  $\times$  2. Sasanian–Early Islamic.

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- 891 Tell Abū Milleh. 160 diam.  $\times$  2.4. Seleucid-Parthian.
- 892 Tell Krīnwīs. 60 diam.  $\times$  2.8. Small hummocks of debris extended NW and SE from mound along a broad, old levee. Late Islamic.
- 893 Tell Khesayn al-Seghir From Inspectorate of Surveys records, file 280, register 440. Recorded as Islamic.
- 894 Tell Abū Dhahab. From Inspectorate of Surveys records, file 46, register 1587. Recorded as Parthian.
- 895 Tell Bukhera'. From Inspectorate of Surveys records, file 45, register 1587. No dating assessment available.
- 896 Tell Abū Skhayr. From Inspectorate of Surveys records, file 44, register 1587. Recorded as Parthian.
- 897 Tell al-Dhuba'i. From Inspectorate of Surveys records, file 42, register 1587. Recorded as Parthian.
- 898 Tell al-Ikhaywan. From Inspectorate of Surveys records, file 284, register 1587. Recorded as Akkadian-Ur III, Parthian. (N.b. This dating should be treated with great reserve. Early datings also were assigned in these records to sites 878, 882, and 891, none of which was found to have been occupied earlier than the Neo-Babylonian period.)
- 899 Tell Mugharat al-Gharbi. From Inspectorate of Surveys records, file 37, register 1587. Recorded as Neo-Babylonian-Parthian.
- 900 Tell Mugharat al-Sharqi. From Inspectorate of Surveys records, file 49, register 1587. Recorded as Neo-Babylonian-Parthian, Islamic.
- 901 Tell Abū Khay, 750 NW  $\times$  350  $\times$  9. Neo-Babylonian-Achaemenian-Parthian.
- 902 — 200 NW  $\times$  160  $\times$  2. Parthian-Sasanian.
- 903 — 100 E  $\times$  70  $\times$  2.2, with a small outlier adjacent to NW end. Sasanian-Early Islamic, some Samarran.
- 904 — 280 NNW  $\times$  160  $\times$  2.3. Sasanian.
- 905 — 300 NNW  $\times$  140  $\times$  2.5. Sasanian-Early Islamic-possible Samarran, Recent.
- 906 — 200 diam.  $\times$  3, but with additional debris at plain level extending NW for 300 m. Sasanian, Late Islamic. The latter occupation is limited to the mound.
- 907 — 250 NE  $\times$  160  $\times$  2.4. Immediately NNW is a second, 160 diam.  $\times$  2. Achaemenian-Parthian.
- 908 — 220 NW  $\times$  140  $\times$  2, additional debris tailing off SE for 300 m. Sasanian.
- 909 — 50 diam.  $\times$  1.2, the character of the debris suggesting an isolated building rather than a settlement. Sasanian.
- 910 — 140 diam.  $\times$  2. Sasanian-Early Islamic.
- 911 Part of Tūlūl Sūtail. 400 N  $\times$  100, maximum elevation 6 m at N end and with a low saddle in middle. Sherds also extend widely to E at plain level. Mainly Sasanian-Early Islamic, but with a small Samarran occupation also.
- 912 — 130 diam.  $\times$  0.2. Debris may continue S under adjoining dunes, for 150 m S is a sparse cluster of sherds within an area 80 m in diam. A similar cluster, in this case surely detached, occurs 200 m farther SSW. Early Uruk.
- 913 — 80 diam.  $\times$  2. 100 m W is a second, 140 diam.  $\times$  0.8. A third, 200 m SSW and SSE of the first and second respectively, is 180 diam.  $\times$  1. Additional debris tails off farther SSE. Sasanian.
- 914 — 400 NNW  $\times$  300, mostly 1 m or less but rising to 2 m at SSE end. Achaemenian-Parthian-Sasanian.
- 915 — 90 diam.  $\times$  1.8. Sasanian-Early Islamic.
- 916 — 400 NW  $\times$  80  $\times$  2.8, with smaller, lower clusters of debris extending farther NW. Sasanian-Early Islamic, trace of Samarran.
- 917 — 80 E  $\times$  50  $\times$  1.2. Crust of white deliquescent salts and associated soil conditions severely limit pottery collection and identification. Probably in the Neo-Babylonian-Achaemenian-Parthian range, but cannot be specified more closely.
- 918 — 110 NW  $\times$  50  $\times$  2. A second, much smaller mound lies about 100 m WNW. Very saline; sparse pottery. Sasanian, possibly also Early Islamic.
- 919 — 130 WNW  $\times$  50  $\times$  0.7. Very saline; sparse pottery. Sasanian, probably also Early Islamic.
- 920 Ishān Nabi Yunis. From Inspectorate of Surveys records, file 356, register 2792. Recorded as Islamic.
- 921 — 140 diam.  $\times$  0.3. Pottery sparse. Parthian.
- 922 — 140 E  $\times$  110  $\times$  2. Sasanian-Early Islamic, trace of Samarran.
- 923 — 2 mounds 80 diam.  $\times$  2.4, about 100 m apart NW-SE. Sasanian-Early Islamic.
- 924 Tell Abū Khorfān. 320 diam.  $\times$  3.5. Trace of Early Dynastic I. Sasanian-Early Islamic.
- 925 — 550 NW  $\times$  100, rising from 0.8 SE to 2.8 NW. Larger, low part of site Sasanian. High NW end includes small Early Islamic and Recent occupations.
- 926 — 350 NW  $\times$  180  $\times$  1. Sasanian.
- 927 — 200 NNW  $\times$  120  $\times$  2.2. Sasanian.
- 928 Ishān Sbayj. From Inspectorate of Surveys records, file 334, register 2792. Recorded as Ubaid, Sasanian. (The Ubaid designation probably indicates the presence of clay sickles. In view of the paucity of Ubaid sites, an Uruk designation is much more likely.)

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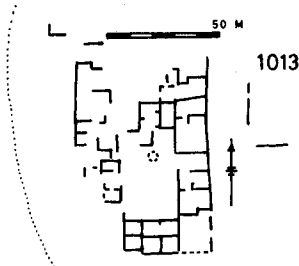
- 929 Ishān al-Jarna. From Inspectorate of Surveys records, file 335, register 2792. No provisional dating recorded.
- 930 and 931 — Through some confusion, three site names are identified with these two locations: Ishān al Nuwawis, Tūlūl al-Wardiya, and Abū al-Milleh. From Inspectorate of Surveys records. All are in file 338, register 2792. Recorded as Parthian.
- 932 — 120 diam.  $\times$  1.8. Cassite-Parthian.
- 933 — Main mound 320 N  $\times$  180  $\times$  4. 300 m W is a second, 100 diam.  $\times$  1. Trace of Uruk, possible Akkadian ribbed ware on smaller mound. Both are mainly Larsa-Old Babylonian.
- 934 — 140 diam.  $\times$  0.2. Sasanian.
- 935 — Sparse sherds at plain level within an area 90 m in diam. Early Uruk.
- 936 — 80 diam., plain level. 100 m SE is a site 40 diam., plain level. SE site Early Uruk, NW site Recent.
- 937 — Sparse pottery at plain level within an area 80 m in diam. Uruk.
- 938 — 100 diam.  $\times$  1.8, with low debris extending 80 m NW, Sasanian-Early Islamic.
- 939 — 200 N  $\times$  120  $\times$  0.6. Numerous hummocks consist in the main of ancient kilns, some with fused pottery still in place. Kiln wasters of fused clay sickles, as well as numerous complete specimens and hundreds of fragments, were particularly prominent. Early Uruk.
- 940 — 220 diam.  $\times$  0.3. 60 m E is a second mound, 80 diam.  $\times$  0.1, constituting an apparently separate nucleation, although the debris was relatively sparse. The remains of at least one pottery kiln are visible near the center of the larger mound. Main mound primarily Early/Middle Uruk. Late Uruk largely limited to SW quadrant. Intensive collection #1 was made in circular area 5 m in radius near center of it. Collection #2 was made somewhat NE of apparent center of smaller, entirely Late Uruk mound. There is a little Sasanian-Early Islamic pottery on the smaller site, possibly not reflecting a real occupation.
- 941 — 220 ENE  $\times$  140  $\times$  2.4. Mud-brick paving or tomb roofing exposed by wind erosion. Sasanian.
- 942 — 220 WNW  $\times$  90  $\times$  2.4. A smaller, lower tell lies 100 m NE. There are brick-covered tombs on the main mound that have been partly exposed by wind erosion. The main mound is Parthian, possibly also some Sasanian. The smaller mound appears to be only Sasanian.
- 943 — Plain level, perhaps 180 diam., but pottery sparse, limits diffuse. Parthian.
- 944 — 250 diam., plain level. Immediately NNE is a second large, low area of same date, only a central nubbin reaching 1 m ht. More scattered outcrops of debris occur also to the S. Trace of Uruk. Akkadian-Larsa. The scattered debris to the S is Parthian.
- 945 — 25 diam., plain level. Jemdet Nasr.
- 946 — An almost continuous strip of debris extending E-W for 1,200 m. Width varies from 80 to 120 m. Most prominent elevation, at W end, is a low mound 120 E  $\times$  90  $\times$  0.8. Smaller outcrops of sparse debris continue at intervals still farther to W. Trace of Uruk. Parthian-Sasanian.
- 947 — 180 diam.  $\times$  3.3. 100 m SSW is a smaller mound, 160 NNE  $\times$  30  $\times$  0.6. Probably a small Uruk settlement, confined to the smaller mound. Both are mainly Larsa-Old Babylonian-Cassite-Middle Babylonian.
- 948 — 260 diam.  $\times$  2.8, surmounted by dunes. Sasanian.
- 949 — 260 NNE  $\times$  150  $\times$  0.5. Late Islamic.
- 950 — 120 NNW  $\times$  20  $\times$  0.4, although debris at plain level west of low mound may double its width. Possible Jemdet Nasr. Early Dynastic I.
- 951 — Sparse debris, scattered hummocks within perhaps 100 diam. Possibly a small early settlement, of Uruk or Jemdet Nasr date. Trace of Akkadian, Ur III-Larsa. Recent.
- 952 — 80 NNE  $\times$  30  $\times$  0.3. This site is believed to have been obliterated during large-scale land-leveling operations in 1975. Early Uruk, Jemdet Nasr.
- 953 — Low hummocks and debris at plain level within an area 110 N  $\times$  20. Possible Jemdet Nasr. Early Dynastic I.
- 954 — 160 N  $\times$  90  $\times$  0.2, consisting mainly of ill-defined clusters of debris at surface level. Traces of Uruk, Cassite. Middle/Neo-Babylonian, mainly Parthian.
- 955 — 180 diam., boundaries somewhat indeterminate. A series of scattered, low, brick-covered mounds, the highest 2.6 m. The shape and contours of the individual mounds suggest separate buildings. Bricks 18-23 cm sq. Sasanian-Early Islamic. The small bricks suggest a somewhat longer continuation of the site than can be confirmed from the ceramic evidence.
- 956 — 120 diam.  $\times$  0.4. Achaemenian-Parthian.
- 957 — 180 diam.  $\times$  1.4. Sasanian-Early Islamic, Recent. Probably associated with the earlier occupation is the broken-off base of a plainware jar containing traces of an incantation.
- 958 — Three small hillocks of debris. Parthian.
- 959 — 120 diam.  $\times$  0.3, partly dune-covered. Trace of Uruk and Cassite, mainly Middle Babylonian-Achaemenian, a few Parthian graves.

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- 960 — 260 diam.  $\times$  1.6. Trace of Uruk. Larsa-Cassite.
- 961 — 100 diam  $\times$  0.3, bisected by old canal bed from NW. Trace of Uruk. Neo-Babylonian-Achaemenian-Parthian.
- 962 — 140 NW  $\times$  80  $\times$  1, with debris continuing SE under dunes. Sasanian.
- 963 — 300 NW  $\times$  120  $\times$  3. Sasanian-Early Islamic.
- 964 — 150 NW  $\times$  50  $\times$  0.1. This site is believed to have been obliterated during large-scale land-leveling operations in 1975. Early/Middle Uruk.
- 965 — Size and ht. obscured by dunes but about 150 diam., low. Sasanian.
- 966 — 140 diam.  $\times$  0.7. Sasanian.
- 967 — 120 NE  $\times$  90  $\times$  3. Achaemenian-Parthian.
- 968 — Central mound 150 diam.  $\times$  1.2. Immediately NW is a second, 100 NW  $\times$  60  $\times$  1. 150 m ESE is a third, 120 NE  $\times$  90  $\times$  1.6. Mainly Sasanian. Some Early Islamic on first and third mounds.
- 969 — 180 NE  $\times$  150  $\times$  1, although overlying dunes may obscure full size and ht. Sasanian-Early Islamic.
- 970 — At least 160 diam.  $\times$  1, but overlying dunes may obscure larger size. Primarily Ur III-Larsa; also Parthian.
- 971 — 140 N  $\times$  50  $\times$  2.1. Cassite.
- 972 — 130 N  $\times$  40  $\times$  2.2. 40 m NNE is a second, 100 diam.  $\times$  1.1. A third, 40 diam.  $\times$  0.8, is immediately WSW of the second. Additional low debris extends NNE and SSW from the group. Mainly Cassite, but a few examples of Parthian and/or Sasanian glazed wares also were seen.
- 973 — 90 NNW  $\times$  20  $\times$  0.4. Sasanian.
- 974 — 160 diam.  $\times$  2, with a small conical mound at SE end rising to 5 m. SE across a short gap in levee is a second site, 150 ESE  $\times$  60, with a 4 m conical mound on its W end. These two conical mounds may have been mud-brick forts protecting the ends of a dam across the break in old canal levee between the two mounds, and hummocks in the bed of the break may be vestiges of the dam itself. Some Parthian on the NW mound, but both are mainly Late Islamic-Recent.
- 975 — 360 NNE  $\times$  160  $\times$  0.2. 50 m ENE is a nucleated area of debris at plain level, 80 m in diam. About 600 m SW is an area of similar size, also without perceptible elevation except for a few low hummocks. The main site and its ENE outlier are Early Uruk, with at most a very limited Middle Uruk continuation. The intensive collection was made within a circle of 5 m radius E of the center of the main site. The SW site is exclusively Late Uruk.
- 976 — Low hummocks within an area roughly 60 diam., although somewhat elongated SE. Early/Middle Uruk, Middle/Neo-Babylonian.
- 977 — Low hummocks, debris at plain level within an area 80 diam. 30 m E across a later canal bed is a second, 120 N  $\times$  15-20, sparse pottery at plain level. The W part is Early Uruk, the E part Late Uruk-Jemdet Nasr.
- 978 — 150 N  $\times$  110  $\times$  0.4. Sasanian.
- 979 — Few small hummocks, sparse debris at plain level, perhaps 90 diam. Possible Late Uruk. Jemdet Nasr.
- 980 — 90 diam.  $\times$  0.1. Early/Middle Uruk.
- 981 — 160 diam.  $\times$  0.2, although debris is sparse and there is no perceptible elevation in the central part of site. 300 m NW is a second, 80 NW  $\times$  50  $\times$  0.1. Early Uruk.
- 982 — Low hummocks, sparse pottery, 30 diam. Early/Middle Uruk.
- 983 Tūlūl Werrish. An irregular chain of mounds exceeding 1 km in length. Surrounded and somewhat overlain by dunes, it may or may not constitute a single settlement. The main summit at the N is 170 diam.  $\times$  4.2. The second, 100 m S, is 130 diam.  $\times$  2. Immediately SSW of that is a third, 160 diam.  $\times$  2.5. Lower mounds continue S and SSW under dunes. Main mound at N, Ur III-Larsa, Parthian, very limited Early Islamic. Remainder of site Sasanian, except that a small mound well down the chain to the S, partly obscured by dunes, is Neo-Babylonian-Parthian.
- 984 — 180 diam.  $\times$  1.2, but girdled and partly covered with dunes and hence possibly larger. Parthian-Sasanian.
- 985 Tell Abū Jawan. Main mound 300 ENE  $\times$  220  $\times$  7, but lower mounds adjacent to ends increase length of complex to 500 m. Parthian-Sasanian.
- 986 — 180 diam.  $\times$  4.5. Sasanian-Early Islamic.
- 987 — 100 NW  $\times$  70  $\times$  1.4. A second, lower but of about the same size, is adjacent ESE. Neo-Babylonian-Achaemenian-Parthian.
- 988 — 200 NE  $\times$  140  $\times$  2, bisected by old canal bed from NW. 80 m SW is a second, 110 diam.  $\times$  2.2. A third, much smaller, is 120 m W of first. Sasanian.
- 989 — Adjacent settlements on opposite banks of a former canal. To the N is a mound 350 WNW  $\times$  80  $\times$  2.2, with four closely spaced summits. At the W end of settlement S of canal is a detached mound 120 diam.  $\times$  3. Farther E is a mound 250 WNW  $\times$  90  $\times$  2.6, with scattered debris and small mounds continuing farther ESE. The W end of the mound to the N of the canal is Neo-Babylonian-Achaemenian-Parthian, while the E

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- end is mainly Sasanian. The detached mound S of canal is Cassite-Parthian, while the mound E of it is Parthian-Sasanian.
- 990 — 200 NW  $\times$  170  $\times$  1.5. A second, somewhat smaller mound is immediately WNW. Sasanian.
- 991 — 110 diam.  $\times$  2. 200 m SSE is a second, 100 N  $\times$  50  $\times$  0.3. The main site is Neo-Babylonian-Achaemenian, possibly continuing into Parthian. The small mound is Recent.
- 992 — 70 WNW  $\times$  40  $\times$  1.5. Sasanian, possibly also Early Islamic.
- 993 — 80 diam.  $\times$  0.2. Cassite.
- 994 — 80 diam.  $\times$  0.2. Cassite.
- 995 — 110 NNW  $\times$  40  $\times$  0.6. Parthian.
- 996 — Tell al-Thien. 170 NW  $\times$  140  $\times$  2.5. Saline; limited collection. Possibly Akkadian. Mainly Ur III-Larsa.
- 997 — 100 NE  $\times$  70  $\times$  0.8, SW end much reduced in width. Ur III-Larsa.
- 998 Tell Tine. A small, high, conical mound, probably the remains of a qal'a, is adjacent to the WSW edge of a mound 180 diam.  $\times$  2.5. The larger mound is Achaemenian-Parthian. The qal'a and its immediate surroundings are Late Islamic-Recent.
- 999 — 170 WNW  $\times$  140  $\times$  4.2. Cassite-Parthian.
- 1000 — 380 NW  $\times$  240  $\times$  4. Saline surface, sparse pottery. Larsa-Old Babylonian-Cassite.
- 1001 Tell Drehem, ancient Puzrish- (or Sellush-) Dagan. 560 NW  $\times$  275  $\times$  8.5, reaching this ht. only in a small eminence suggestive of a ziggurat near the SE end of site. Most of the area is less than 2 m in elevation. Surface very saline and spongy, sharply limiting surface collections, but extended search concentrating on spoil banks around old excavations or pits produced an adequate sample. Entire collection was consistent with an occupation limited to the Ur III-Larsa period.
- 1002 — 510 NW  $\times$  180  $\times$  4.2, although only the middle of three mounds in line constituting this site reaches this full width. Trace of Uruk. Neo-Babylonian-Achaemenian-Parthian, very limited Late Islamic-Recent.
- 1003 — 220 diam.  $\times$  2.2, bisected by an old canal bed from NW. Trace of Ur III-Larsa. Cassite-Parthian.
- 1004 Qal'a al-Ghanam. Square mud-brick enclosure, sides 60 m long and oriented 050° and 320°. Towers at four corners. 250 m WSW is a conical mound 30 diam.  $\times$  2, probably a much less well preserved qal'a. Late Islamic-Recent.
- 1005 Tell al-'Arris. 150 diam.  $\times$  4. 50 m E is a second, 180 E  $\times$  80  $\times$  2. There is an imam immediately N, still built of reed mats in 1968 but replaced by a brick building soon afterward. Trace of Uruk. Cassite-Parthian.
- 1006 — 140 NW  $\times$  80  $\times$  1.5. Pottery sparse. Cassite.
- 1007 — 90 NW  $\times$  30  $\times$  1.8. Old Babylonian-Cassite.
- 1008 — 100 diam.  $\times$  0.4. Akkadian-Larsa.
- 1009 — 100 ENE  $\times$  40  $\times$  0.4. Possibly Akkadian, mainly Ur III-Larsa.
- 1010 — 110 diam.  $\times$  1. 100 m SW is a second, 240 E  $\times$  110  $\times$  0.7. Sasanian.
- 1011 — 80 diam.  $\times$  0.2. 100 m SE is a second, also small. Mainly Parthian, some Sasanian.
- 1012 — 80 E  $\times$  50  $\times$  0.4. Sasanian.
- 1013 — 280 E  $\times$  220  $\times$  5. A small outlier is adjacent to SW end and other small, low mounds extend 200 m NE to right bank of Shatt al-Nil. Well-preserved architectural traces of what may be a single building of 23 cm sq. brick were photographed by kite, permitting much of the plan to be traced. The building, of which the S end is omitted in the plan, is about 85 N  $\times$  40. Wall hts. are preserved to at least 0.5 m, although this may be mainly foundation courses with walls themselves of mud brick. Sasanian-Early Islamic, some Samarran.



- 1014 — 240 NW  $\times$  150  $\times$  4, with four separate summits within this area. A small fifth mound is 200 m NE. Probably Sasanian. Early Islamic, a little Samarran.
- 1015 — 200 diam.  $\times$  6. Smaller mounds and surface debris extend 250 m S to a second, 220 E  $\times$  80  $\times$  4.5. 50 m ENE of first mound is a third, 200 NW  $\times$  160  $\times$  2.5. Other, smaller mounds lie 150 m WNW and 300 m ESE. Many walls observed on summit of main mound, of 24-27 cm sq. brick. A complete blue-glazed jar was found with rim protruding just above surface of main mound. Both the jar and its incipient exposure beneath eroding topmost level were exactly paralleled at site 1213. (This drawing was previously published in Adams 1970, pl. 3, fig. 7d, under an earlier survey field number, now superseded.) Probably Sasanian, mainly Early Islamic, some Samarran.

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- 1016 — 180 E  $\times$  100  $\times$  1.4. There is also a small outlier 150 m W. Sasanian–Early Islamic.
- 1017 — 70 diam.  $\times$  5, consisting in large part of the ruins of a single building apparently constructed of 21 cm brick. Low debris with sparse pottery extends 120 m WSW, and there is also a small outcrop 100 m SSE. Early Islamic. The size of the bricks suggests that the solitary building may be later than the abandonment of the underlying mound, perhaps of Middle Islamic date, but no pottery was observed attesting to an occupation of the site during that period.
- 1018 — 90 diam.  $\times$  0.5. Sasanian.
- 1019 — 170 diam.  $\times$  0.8. Early Uruk, Ur III–Larsa.
- 1020 — 250 diam.  $\times$  0.8. Intensive collection #1 from a circle of 5 m radius, N central, #2 from same, S central (about 100 m S of #1). 150 m S is a second mound, 140 diam.  $\times$  0.1. Mainly Early Uruk. A localized continuation into Middle or Late Uruk times is confined to the S part of the main mound.
- 1021 — 160 diam.  $\times$  0.4. Uruk, mainly Cassite.
- 1022 — 70 diam.  $\times$  1.2. Probably Sasanian, mainly Early Islamic.
- 1023 — 120 diam.  $\times$  2.6. A second mound, 120 diam.  $\times$  2, is 80 m S with a low ribbon of debris arcing first SE and then SW to connect them. Possibly Sasanian. Early Islamic, some Samarran.
- 1024 — 140 N  $\times$  90  $\times$  2.4. Early Uruk, Ur III–Larsa.
- 1025 — 450 WNW  $\times$  180  $\times$  0.8. Trace of Cassite. Middle Babylonian. Probably mainly Neo-Babylonian. Achaemenian.
- 1026 — 280 diam.  $\times$  4. Traces of walls on summit, 26 cm sq. brick. Sasanian–Early Islamic, a little Samarran.
- 1027 — 160 diam.  $\times$  2.2. 20 m SW across a branch or alternate bed of the Shatt al-Nil, the site continues for an area 90 diam.  $\times$  0.2. Eroded mud-brick structures, possibly tombs, rise slightly above the surface of the main mound. Probably a small, underlying Uruk occupation. Probably some Larsa–Old Babylonian. Mainly Cassite.
- 1028 — 240 NNW  $\times$  170  $\times$  2.2. Sasanian, some Early Islamic.
- 1029 — 80 diam.  $\times$  0.7. Sasanian.
- 1030 — 180 diam.  $\times$  0.4, on left bank of Shatt al-Nil. Opposite is a mound 300 NW, from 40 to 110 m in width and 2.5 m high. There is much 26 cm sq. brick. Early Islamic.
- 1031 — 140 NW  $\times$  90  $\times$  3. Lower debris tails off SE. Traces of Late Uruk, Early Dynastic. Mainly Ur III–Larsa. The debris to the SE is Early Islamic.
- 1032 — 770 WNW  $\times$  380, consisting of large, low hummocks and much debris on intervening plain surface. Later canal branches cross the site at intervals, with debris also found on their low spoil banks. Early/Middle Uruk settlement probably limited to SE end of site, as was the Early Dynastic I occupation. The Jemdet Nasr occupation seems to have been much more extensive, but the dominant component in surface collections is Akkadian–Larsa.
- 1033 — 90 diam.  $\times$  0.2. Sasanian.
- 1034 — 180 WNW  $\times$  150  $\times$  1.3. 100 m SSW is a second, 160 diam.  $\times$  0.9. A third, 75 NNW  $\times$  20  $\times$  0.2, is about 400 m WSW of second. Apparently there is an underlying Early/Middle Uruk settlement at the second mound. The second and third mounds are Cassite–Middle Babylonian, while the first mound may be Cassite only.
- 1035 — 110 diam.  $\times$  2.5. Bricks 23–27 cm sq. On the opposite, left bank of the Shatt al-Nil, 200 m above this mound, is a second, 40 diam.  $\times$  1. Bricks on the latter are 21 cm sq. and pottery is very sparse. The first mound is Early Islamic. The second is almost certainly later but cannot be assigned a definite date from the very limited ceramic evidence.
- 1036 — Four mounds forming an E–W line 350  $\times$  100  $\times$  1.9. Immediately S is another, 120 diam.  $\times$  2. There may be small Jemdet Nasr and Ur III–Larsa occupations on the NW end of site, or the sherds suggesting this may be merely strays from adjacent site 1032. In any case, mainly Sasanian–Early Islamic.
- 1037 — 160 WNW  $\times$  120  $\times$  2.2. Immediately S is a second, 140 WNW  $\times$  90  $\times$  1.6. Trace of Cassite. Neo-Babylonian–Achaemenian–Parthian.
- 1038 — 140 diam.  $\times$  1.2. Probably Sasanian. Early Islamic.
- 1039 Tell Hindi, 350 NW  $\times$  200  $\times$  4.5, with smaller, lower mounds adjoining NE that give the complex the shape of a T. Mostly or only Sasanian on outlying parts of site, some Early Islamic on main mound.
- 1040 — 60 diam.  $\times$  0.3. Sasanian.
- 1041 — 90 diam.  $\times$  2. Sasanian.
- 1042 — 220 WNW  $\times$  160  $\times$  2.4. 300 m ENE is a second, 180 WNW  $\times$  100  $\times$  0.8. Probably Sasanian, particularly at the second mound, but both are mainly Early Islamic.
- 1043 — 150 ENE  $\times$  80  $\times$  0.8. At WSW end, slightly detached from site, is a brick pile 10 diam.  $\times$  1.5 (bricks 20–21 cm sq.). Possible Sasanian. Early Islamic. The brick pile may be the ruin of a solitary, somewhat later building.
- 1044 — 280 NE  $\times$  160  $\times$  2, debris tailing off SW. Limited Uruk. Neo-Babylonian–Achaemenian–Parthian.

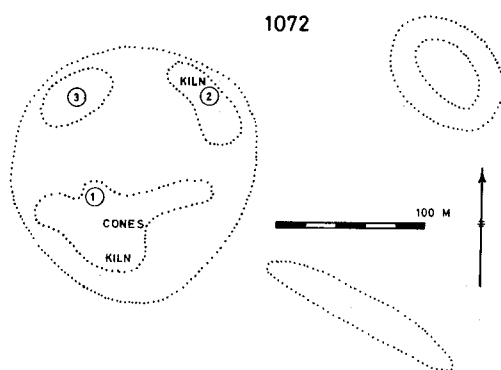


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- 1045 — 140 NW  $\times$  110  $\times$  2.4. Probably Sasanian. Early Islamic.
- 1046 — 330 NE  $\times$  260  $\times$  0.1, but with well-defined boundaries and dense debris in spite of low ht. Early Uruk.
- 1047 — 200 NNE  $\times$  90  $\times$  1. 40 m S is a second, 120 diam.  $\times$  0.6. A third is 150 m W of second, 140 N  $\times$  90  $\times$  0.4. First two Sasanian, third Sasanian–Early Islamic.
- 1048 — 110 diam.  $\times$  1. Sasanian.
- 1049 — Two adjacent sites 250 NE  $\times$  70  $\times$  0.2, separated by a wide later canal. Possibly they were originally joined, with the canal having been cut through to divide them. Probably a small settlement of Jemdet Nasr or Early Dynastic date. Mainly Akkadian–Larsa.
- 1050 — 80 diam.  $\times$  0.6. Trace of Uruk. Achaemenian–Parthian.
- 1051 — 170 NW  $\times$  130  $\times$  2. Probably Sasanian. Early Islamic.
- 1052 — 90 diam.  $\times$  1. Sasanian–Early Islamic.
- 1053 — 100 NW  $\times$  30, reaching 2.5 m ht. only in a prominent brick pile (23 cm sq.) near SE end. Early Islamic–Samarra.
- 1054 — 100 N  $\times$  60  $\times$  0.8. Perhaps a small Uruk occupation. Larsa–Old Babylonian–Cassite.
- 1055 — 250 NW  $\times$  160  $\times$  1.5. Ur III–Larsa.
- 1056 — 900 N  $\times$  250–300, decreasing to 100–150 near S end. Low except near center, where it rises to 2.4 m ht. Early Dynastic I, and possible Jemdet Nasr, are confined to central part of site. Mainly Akkadian–Larsa.
- 1057 — 300 NE  $\times$  250, with many low summits rising to 1 m or less. Sasanian.
- 1058 — 420 NW  $\times$  100  $\times$  3. Band of debris narrows and elevation declines toward the SE. SE end Sasanian only, NW end Sasanian–Early Islamic.
- 1059 — 230 NW  $\times$  160  $\times$  0.3. Mainly Jemdet Nasr. A little Akkadian–Larsa.
- 1060 — 90 diam.  $\times$  0.8. Sasanian.
- 1061 — 90 diam., sparse pottery. A few brick piles (20–22 cm sq. brick) along the Shatt al-Nil rise to 2 m. Early Islamic. The small bricks may reflect isolated, later buildings.
- 1062 — 180 NNE  $\times$  90  $\times$  0.4. Sasanian.
- 1063 — 220 N  $\times$  70, scattered low hummocks and continuous debris. Probably Sasanian. Early Islamic.
- 1064 — 130 NW  $\times$  80  $\times$  1.4. Trace of Uruk. Achaemenian–Parthian. One overfired or refired brick has a very faint stamp impression. According to Douglas Kennedy, the few legible signs suggest that it is Neo-Babylonian.
- 1065 — 300 NNW  $\times$  180  $\times$  1.6. 50 m WNW of the NNW end of the site is a second, 100 WNW  $\times$  50  $\times$  0.8. Several mud-brick pavings and outlines of buildings, also many 34 cm sq. baked bricks on main mound. Sasanian.
- 1066 — 150 N  $\times$  130  $\times$  1.8. Sasanian. Mainly Early Islamic.
- 1067 — 220 E  $\times$  150  $\times$  2. Probably a small Uruk occupation. Mainly Neo-Babylonian–Achaemenian–Parthian.
- 1068 — 160 diam.  $\times$  2, with small hummocks tailing off farther S. Sasanian–Early Islamic.
- 1069 — 270 E  $\times$  140  $\times$  1.9, with the E end lower and slightly detached. Small Uruk occupation. Mainly Larsa–Old Babylonian. Less Cassite.
- 1070 — 250 diam.  $\times$  0.8, with remains of several kilns forming higher hummocks. Small Uruk occupation. Neo-Babylonian–Achaemenian–Parthian.
- 1071 — 460 WNW  $\times$  300  $\times$  1.5, surmounted by a high ridge of dunes. Small Uruk occupation. Mainly Ur III–Old Babylonian.
- 1072 — See sketch map showing loci of three intensive collections within circles of 5 m radius. Maximum elevation coincides with area of cone concentration shown on map immediately SE of collection #1, and is about 40 cm. A modern machine-dug canal trench was in the process of being extended through the mound here in 1975, although still at a very superficial level. Cautious probing below banks of cones that appeared most likely to be in situ failed to disclose any that definitely continued below the present surface. Collection #2 was made in the vicinity of an apparent Middle or Late Uruk pottery kiln. The main mound, on separate components of which all three intensive collections were made, is Early/Middle/Late Uruk. The ENE mound apparently is Early/Middle Uruk only. There is a very light sprinkling of later pottery, including Sasanian–Early Islamic and Recent, but hardly enough to represent significant occupations. Weathered shell collected on main mound has been identified by Stephen F. Lintner as Gastropoda Prosobranchia Mesogastropoda Strombidae *Strombus (Conomurex) decorvus* (Röding), “a marine species common to the ‘Arab’ or ‘Persian’ Gulf” (pers. comm., 7 September 1976). Also collected on the main mound were five obsidian blade segments that have subjected to neutron activation analysis by A. Colin Renfrew and John Dixon. Four of them are reported to give analyses typical for group 4C, corresponding to the obsidian source at Nemrut Dag on the northwest side of Lake Van. The fifth corresponds to group 1g, still not precisely located but probably some distance to the west or southwest of

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Lake Van (Renfrew, pers. comm., 10 July 1978; cf. Renfrew and Dixon 1976).



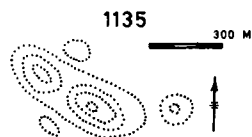
- 1073 Imām Khudhr. 160 diam.  $\times$  2.2, surmounted by a domed shrine 8 m square. Sasanian, Recent.
- 1074 — 80 NNW  $\times$  40  $\times$  0.4. Seleucid-Parthian.
- 1075 Umm al-Tus. 120 diam.  $\times$  2.6. 500 m SE is a second, 80 diam.  $\times$  0.6. 100 m SE of second are the ruins of a qal'a. The second mound and the nearby qal'a are Old Babylonian-Cassite, Recent. The first has little Cassite, is mainly Middle-Neo-Babylonian.
- 1076 — 220 NNE  $\times$  90  $\times$  1.6. 100 m NW is a second, 90 diam.  $\times$  1.6. Sasanian.
- 1077 — 100 diam.  $\times$  0.8. Middle/Neo-Babylonian.
- 1078 — 230 NE  $\times$  160, rising to 2.4 m ht. only at SW end. Sasanian-Early Islamic.
- 1079 — An irregular group of seven or eight mounds falling in an area 900 NNE  $\times$  200, all 1.8 m ht. or less. Mainly Sasanian. Some Early Islamic, Recent.
- 1080 — 280 diam.  $\times$  1.8. Middle/Neo-Babylonian, Sasanian-Early Islamic.
- 1081 — 220 NW  $\times$  140  $\times$  2.2. Achaemenian-Parthian.
- 1082 Tell Abyadh. 180 diam.  $\times$  5. Small, low outlier 120 m NE. Mainly Cassite-Achaemenian. Limited Sasanian.
- 1083 — 140 diam.  $\times$  3, with a smaller mound adjacent SE. Cassite-Achaemenian, limited Sasanian.
- 1084 Tell al-Howaylah. 200 diam.  $\times$  2. Sasanian-possible Early Islamic.
- 1085 — 170 diam.  $\times$  0.7, with a second, smaller mound adjoining WNW. Sasanian-possible Early Islamic.
- 1086 — 200 NW  $\times$  90  $\times$  1. Collecting conditions poor as a result of adjacent village, modern debris, soil salinity. Early Dynastic II/III, Cassite, some Parthian.
- 1087 Tell Kofyaya. 260 diam.  $\times$  2.4. Trace of Early Dynastic I. Sasanian-Early Islamic.
- 1088 — 300 NW  $\times$  190  $\times$  2.4. Sparse pottery.

Mainly Ur III-Larsa. Some Neo-Babylonian-Achaemenian.

- 1089 — 130 diam.  $\times$  3. Sparse pottery. Early Dynastic II/III-Akkadian-Ur III-Larsa, Recent.
- 1090 Tell Fakhar. 350 NE  $\times$  250  $\times$  2.8. Cassite-Middle Babylonian; possibly also Neo-Babylonian.
- 1091 — 250 NW  $\times$  200  $\times$  2. Cassite-Middle Babylonian, Parthian.
- 1092 — 70 diam.  $\times$  1.4. Sasanian-Early Islamic.
- 1093 — 280 NW  $\times$  120  $\times$  1. Limited collection. Probably Middle/Neo-Babylonian. Mainly Sasanian-Early Islamic.
- 1094 — 80 diam.  $\times$  2.2, although this may include the eroded ruins of a small qal'a or even a stabilized dune. Possible Middle/Neo-Babylonian. Sasanian, Recent.
- 1095 — 250 WNW  $\times$  140  $\times$  2. Surface pottery extremely sparse and decomposed. 30 m NNW is a second mound, 110 WNW  $\times$  60  $\times$  1.2. Main mound probably Sasanian. NNW mound included trace of Uruk, possible Middle/Neo-Babylonian. Mainly Sasanian.
- 1096 Tell Umm al-Fugas. 350 NW  $\times$  250  $\times$  3. 100 m NW is a second (or continuation of the first), 180 diam.  $\times$  1.8. Limited collection owing to high soil salinity; hence types could be recorded only on a presence-absence basis. Middle/Late Uruk. Mainly Jemdet Nasr. Limited continuation into Early Dynastic I.
- 1097 Ishān al-'Arraj. 200 ENE  $\times$  100  $\times$  2.2. Sasanian-Early Islamic.
- 1098 — 180 diam.  $\times$  1.5, although surface pottery is largely confined to central part of the elevated area. Saline soil; poor collecting conditions. Probably Cassite-Middle Babylonian.
- 1099 — 170 NW  $\times$  120  $\times$  2. These dimensions have surely been reduced, however, by a major modern canal cut through the S part of the site, and additional parts of the mound that have been removed for road fill. Old Babylonian-Cassite. Inspectorate of Surveys records also assign an "Ubaid" dating to this mound, which is likely to mean at most that one or more clay sickles were observed at an earlier time.
- 1100 — Low hummocks within an area probably 180 NE  $\times$  100, but obscured by drifted sand. Some Uruk, mainly Jemdet Nasr, a little Ur III-Larsa.
- 1101 Part of Tūlūl Abū Dān. 400 diam.  $\times$  4.5. Parthian-Sasanian-Early Islamic.
- 1102 Part of Tūlūl Abū Dān. 110 diam.  $\times$  4.5. Cassite-Parthian.
- 1103 Tell Dalmaj. 350 NNE  $\times$  280  $\times$  8. Early/Middle Uruk, Larsa-Parthian. A small Sasanian occupation is confined to the summit.

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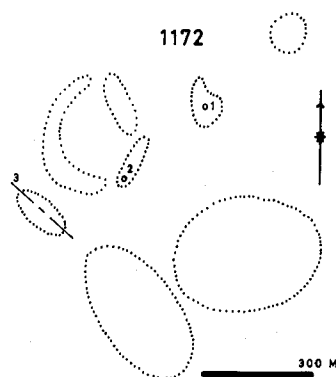
- 1104 Rubahī Dalmaj. 140 diam.  $\times$  4.5. Sasanian–limited Early Islamic.
- 1105 — 180 NNW  $\times$  150  $\times$  0.5. Neo-Babylonian–Achaemenian–Parthian.
- 1106 — 120 diam.  $\times$  0.4. Sasanian–Early Islamic.
- 1107 — 300 N  $\times$  180  $\times$  4.2. Immediately W is a second, 80 diam.  $\times$  2.2. 80 m farther W is a third, 130 diam.  $\times$  1. Sasanian–Early Islamic.
- 1108 Tell al-Selu'. 280 diam.  $\times$  5. Trace of Uruk. Neo-Babylonian–Achaemenian–Parthian.
- 1109 — 190 diam.  $\times$  2. Limited Uruk, mainly Larsa–Old Babylonian, less Cassite. A few Sasanian sherds were regarded as strays from site 1110.
- 1110 — 220 diam., with four low summits rising to 1 m. Sasanian.
- 1111 — 280 NNE  $\times$  100  $\times$  2. Probably Sasanian. Early Islamic.
- 1112 — 150 diam. Much evidence of late brick-kiln activity so that site may have been higher originally, but two large hummocks still reach 0.8–1 m ht. Possibly a small Uruk settlement. Ur III–Larsa.
- 1113 — 200 diam.  $\times$  2. Early Uruk. Mainly Cassite. A little Sasanian.
- 1114 — 300 NE  $\times$  140  $\times$  4. Early/Middle Uruk, Cassite, Parthian.
- 1115 — Main mound (or perhaps a series of three adjoining mounds) 450 ENE  $\times$  210  $\times$  3. SE, detached, is another, 170 diam.  $\times$  2.5. Possible Uruk site. Mainly Akkadian–Larsa. A few Parthian slipper-coffin fragments may reflect a cemetery. There is an isolated Sasanian building (32 cm sq. bricks) on top of the WSW end of the main mound.
- 1116 — 330 diam.  $\times$  7.5. Sasanian–Early Islamic.
- 1117 — 320 ENE  $\times$  150  $\times$  1. Sasanian–Early Islamic.
- 1118 — 80 E  $\times$  40  $\times$  0.1. 30 m W is a second, 70 E  $\times$  40  $\times$  0.1. But while these limits reflect the slightly elevated areas with densest debris, it must be noted that there is a very wide dispersal of relatively sparse sherds. Intensive collections from circles of 5 m radius: #1, W end of E mound (selected as a possible kiln area with many sherds); #2, W end of W mound. Early Uruk, possibly also Middle Uruk.
- 1119 — A small site completely drifted over with low, stabilized dunes and other aeolian deposits. Hummocks have formed around tamarisk roots, and it was the unusual elevation of these hummocks that suggested the existence of a site here. On the basis of only sporadic exposures of surface material, the site is probably about 120 diam  $\times$  0.6. Trace of Uruk. Sasanian–Early Islamic.
- 1120 — 300 diam.  $\times$  5.5. Plain-level debris extends at least 200 m in all directions from the outer slopes, and 60 m N there is a second mound of less than 1 ha area that is almost as high. Sasanian–Early Islamic.
- 1121 — 320 ENE  $\times$  180  $\times$  3. Settlement debris continues WSW for 900 m along branch canal levee leading from Shatt al-Nīl, thence upstream along the Shatt for 250 m farther. Traces can be seen of buried brick arches, apparently still intact, of 25 cm sq. brick. Perhaps they represent branch canal headworks. Sasanian–Early Islamic.
- 1122 — 130 diam.  $\times$  2.2. Sasanian–Early Islamic.
- 1123 — 120 NNE  $\times$  60  $\times$  0.1. Achaemenian–Parthian.
- 1124 — 310 E  $\times$  240, the maximum width somewhat W of center. Maximum ht. 1 m, rising abruptly to this on W end and sloping away gradually to N, E, and S. Much kiln activity concentrated near W end, and concentrations of wasters and cinders there may account for ht. Intensive collection made in circle of 5 m radius near W summit, supplemented by individual types observed elsewhere. Mainly Early Uruk. Middle/Late Uruk localized.
- 1125 — 140 diam.  $\times$  0.8. 30 m SSW is a second, 120 diam.  $\times$  0.8. Sasanian–Early Islamic.
- 1126 — 160 diam.  $\times$  2.5. 80 m SW a second, 120 diam.  $\times$  0.8, with ruin of a tower. Sasanian. The smaller mound is Recent.
- 1127 Tell Abū Jawārīr. 280 NE  $\times$  240  $\times$  5. Adjacent NNW, perhaps across an old canal bed, is a second, 180 NE  $\times$  80  $\times$  2. Achaemenian–Parthian.
- 1128 — Main mound 180 diam.  $\times$  1, but lower debris extends SSW in an irregular outline to give a maximum length of 380 m. Sasanian.
- 1129 — 200 NW  $\times$  120  $\times$  2.2. Early/Middle/Late Uruk–Jemdet Nasr, Larsa–Old Babylonian–Cassite.
- 1130 — 400 NW  $\times$  330, with three 4 m summits and three lesser ones. Bricks 33 cm sq. Trace of Uruk. Sasanian, probably also Early Islamic.
- 1131 — 320 NW  $\times$  180  $\times$  2.4. Middle/Late Uruk. Mainly Sasanian.
- 1132 — 140 N  $\times$  110  $\times$  1.4. Sasanian–Early Islamic.
- 1133 — 180 diam.  $\times$  3. Sasanian–Early Islamic.
- 1134 — 160 WNW  $\times$  70  $\times$  2.5. A 1.5 m mound on the W end may be the ruin of a small qal'a. Trace of Uruk. Seleucid–Parthian.
- 1135 Tell Rubahiyat al-Torra. See sketch map. Principal summit is 5 m high. Probably an underlying, small Uruk site. Primarily Parthian–Sasanian–Early Islamic.



- 1136 — 130 E  $\times$  90  $\times$  0.3. Parthian–Sasanian.
- 1137 — 140 NW  $\times$  100  $\times$  1.2, virtually all the elevation probably due to a much later structure of which a few broken, reused bricks may be seen on the surface. Plain-level debris, the density of sherds decreasing only gradually at the margins, describes a much larger site area, perhaps 230 WNW  $\times$  120. After a short gap to the W there is a second site, roughly 100 diam. and very low. Intensive collection #1 was made on the N central portion of the E mound, #2 on the E central part of the W mound; both were taken in circles of 5 m radius. Mainly Early/Middle/Late Uruk. Jemdet Nasr–Early Dynastic I limited to a small area on the adjacent ends of the E and W mounds. Very limited Cassite.
- 1138 — 350 E  $\times$  130  $\times$  2. Sasanian.
- 1139 — 300 diam., divided by the Shatt al-Nil, rising to 3.5 m. Bricks 24 cm sq. particularly numerous on N side. Probably Sasanian. Early Islamic.
- 1140 — 120 diam.  $\times$  2, on left bank of Shatt al-Nil. 20 m NNE is a second mound, 50 diam.  $\times$  1. Small, high, conical mounds of baked brick fragments occur downstream and upstream of site on same bank. Brick sizes include 23 and 27 cm sq. Sasanian–Early Islamic.
- 1141 — 200 diam.  $\times$  2.4, left bank of Shatt al-Nil. On opposite bank a second, 130 diam.  $\times$  2.4. Also on right bank, 100 m NW, a third, 100 diam.  $\times$  2.2. Sasanian–Early Islamic.
- 1142 — 140 E  $\times$  120  $\times$  2. Adjacent ENE is a second, 120 NE  $\times$  90  $\times$  2. N of the second is a third mound, 120 diam.  $\times$  2. NE of the second is an area of low debris, 70 diam.  $\times$  0.6. All these may or may not form parts of a single, contiguous settlement; surrounding and overlying dunes made surface examination inadequate. Sasanian–possible Early Islamic.
- 1143 — Site occurs in the middle of a belt of very heavy dune deposits that overlie, and probably are derived from, the levee of a major ancient watercourse. The mound must certainly be 250–300 m diam.  $\times$  4–5 m ht., if not more, but effective surface examination was limited to less than a tenth of this area. Akkadian–Larsa.
- 1144 — An irregular but extensive settlement along the right bank of the Shatt al-Nil. About 680 NW  $\times$  90–150  $\times$  2.4, with a W extension for 220 m along a branch canal offtake. Sasanian–Early Islamic.
- 1145 — 320 ENE  $\times$  170  $\times$  3. Seleucid–Parthian.
- 1146 — 260 diam.  $\times$  6. A second mound, immediately E, is 240 N  $\times$  180  $\times$  2.2. Sasanian–Early Islamic.
- 1147 — 180 NW  $\times$  90  $\times$  1.8. Sasanian–possible Early Islamic.
- 1148 Tell Abū Idhin. 200 E  $\times$  170  $\times$  4. Immediately E is a second, 150 NW  $\times$  90  $\times$  1.8, and two smaller mounds tail off SW from W end. Sasanian–Early Islamic.
- 1149 — 180 NW  $\times$  150  $\times$  1.6. A smaller, lower mound adjoins NE. Sasanian–Early Islamic.
- 1150 — 250 NW  $\times$  90  $\times$  1. Sasanian–Early Islamic.
- 1151 — Four small mounds that may have been brick kilns, the largest 80 diam.  $\times$  2.5. Sasanian.
- 1152 Tell Hamayma. 400 NW  $\times$  240  $\times$  6.5. Possibly a small, underlying Uruk settlement. Trace of Cassite. Neo-Babylonian–Achaemenian–limited Seleucid–Parthian.
- 1153 — 120 diam.  $\times$  1.3, bisected by a canal levee from NW. Site consists primarily of several ancient brick kilns. Seleucid–Parthian, although small hummocks of Sasanian pottery are found along a canal levee from N that passes W of site.
- 1154 — Perhaps 160 diam., plain level. Relatively sparse pottery, and definition of limits of site is complicated by very wide dispersal of debris. Intensive collection within circle of 5 m radius, mound center. Possibly Early/Middle, mainly Late Uruk.
- 1155 — 90 diam.  $\times$  2. 20 m E is a second, 90 diam.  $\times$  1. Sasanian–Early Islamic.
- 1156 — 100 diam.  $\times$  1.8. 200 m S along an old canal levee is a second, 80 diam.  $\times$  1.6. A third, smaller, is 150 m farther S. Neo-Babylonian–Achaemenian–Seleucid–Parthian.
- 1157 — 150 diam., plain level. Exposures of debris are sparse and somewhat discontinuous. Larsa. Limited Parthian.
- 1158 — 180 diam.  $\times$  1.8. 50 m WNW is a second, 70 diam.  $\times$  1.4. A ribbon of surface debris connects and surrounds the mounds and extends 300 m farther E. Parthian.
- 1159 — At least 300 NW  $\times$  150, but sparse debris is much more widely dispersed than this, and clear margins are lacking. Intensive collection within circle of 5 m radius, NW central. Early Uruk.
- 1160 — 120 NNW  $\times$  50  $\times$  0.1. Parthian.
- 1161 — 220 diam.  $\times$  2.4. Trace of Cassite. Neo-Babylonian–Achaemenian–limited Seleucid–Parthian.
- 1162 — 550 NNW  $\times$  160  $\times$  2.2. Parthian.
- 1163 — 130 N  $\times$  70  $\times$  0.1. Intensive collection

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- made in circle of 5 m radius, center. Late Uruk.
- 1164 — 130 NW  $\times$  70  $\times$  0.1. 30 m SE is a second, 30 diam.  $\times$  0.1. Intensive collection made in circle of 5 m radius, main mound, NW central. Early/Middle Uruk. Late Uruk limited.
- 1165 — 230 diam.  $\times$  0.5. Intensive collection made in circle of 5 m radius, S central. Middle-mainly Late Uruk.
- 1166 — 380 NW  $\times$  280  $\times$  2. Early/Middle Uruk, Jemdet Nasr. Limited continuation in Early Dynastic I. Akkadian sherds sparse but fairly widespread, Ur III–Larsa extremely limited and localized. Old Babylonian–Cassite again widespread and substantial.
- 1167 — 280 NE  $\times$  60–80  $\times$  0.6. Sasanian.
- 1168 — 35 diam.  $\times$  0.1. Jemdet Nasr.
- 1169 — 180 NNE  $\times$  140  $\times$  2.2. Possible Uruk and Cassite settlements—or just strays from neighboring site 1170. Mainly Seleucid–Parthian.
- 1170 — 130 diam.  $\times$  1.4. Early/Middle Uruk, Old Babylonian–Cassite.
- 1171 Jer'at Hayf. 750 NW  $\times$  120  $\times$  2.8, but cf. irregular outline shown on base map. Additional small mounds continue SE along an old canal levee but could not be visited because of intensive cultivation around them. Perhaps a small, underlying Cassite site. Mainly Neo-Babylonian–Achaemenian–Parthian.
- 1172 — See sketch-map. It is not clear whether this is a cluster of adjoining settlements or the partially submerged remains of a single, nucleated one. Sherd density declines only slowly at the margins of site area. That, together with low but fairly thick shrub cover of the plain here and hts. of debris nowhere exceeding 0.2, introduces an element of uncertainty and arbitrariness into any map like the one shown. Intensive collections #1 and #2 both were made in circles of 5 m radius at points shown. Collection #3 included every diagnostic sherd seen on a NW–SE traverse of the indicated mound. Early/Middle/Late Uruk, probably with some reduction of occupied area in Late Uruk.
- 1173 — 110 N  $\times$  70  $\times$  0.8. Sasanian–Early Islamic.
- 1174 — 180 NW  $\times$  110  $\times$  2.8. Small Uruk settlement is likely. Trace of Early Dynastic I. Primarily Old Babylonian–Cassite, with a smaller Sasanian–Early Islamic occupation on the lower slope and adjoining plain to the E.
- 1175 — 400 NE  $\times$  180  $\times$  2.5. Air photographs suggest, however, that originally there were two mounds in a NE line, with the one at the NE end built out over the former bed of a major water-course. There is Early Dynastic II/III debris along the NW slope of the SW mound, but both are mainly Old Babylonian–Cassite–Middle Babylonian. The main bed must have been abandoned by that time.
- 1176 — 160 diam.  $\times$  2.2. Sasanian–Early Islamic.
- 1177 — Discontinuous clusters of debris at plain level within an area 140 diam. Old Babylonian–Cassite.
- 1178 — 190 N  $\times$  110  $\times$  0.8. Failing light precluded an intensive sample collection. Types were recorded on a presence-absence basis only. Uruk, Early Dynastic I/II/III–limited Akkadian.
- 1179 — 240 diam.  $\times$  3. Trace of Uruk. Larsa–Old Babylonian–Cassite.
- 1180 — 350 diam.  $\times$  3.2. Probably a small Uruk site. A few Larsa sherds may be strays from nearby site 1188. Mainly Neo-Babylonian–Achaemenian–Parthian, limited Sasanian.
- 1181 — 300 NW  $\times$  200  $\times$  2.2, with lower debris and small, low mounds tailing off NW toward site 1180. There are possible traces of an outer wall and/or tower of baked brick at NW corner of mound. NW part of the site seemed mainly Akkadian–Larsa, SE end predominantly Neo-Babylonian–Achaemenian.
- 1182 Tell al-Sema'. 140 diam.  $\times$  1, with a small, ruined tower forming a mound of debris that rises a further 1.5 m. Rare Cassite. Mainly Sasanian–Early Islamic. Also Recent.
- 1183 — 300 NNW  $\times$  160  $\times$  2.8. Old Babylonian–Cassite, Sasanian–Early Islamic, Recent.
- 1184 — 180 NNW  $\times$  140  $\times$  2.4. 30 m N is a second, 160 diam.  $\times$  2.2. A third, smaller and lower, is NNW of the second. A fourth, also small, is 70 m WSW of the first. The first is Sasanian—possibly also Early Islamic. The others are Sasanian only.
- 1185 — 220 WNW  $\times$  140  $\times$  2.4, right bank of Shatt al-Nil. 20 m WNW on same bank is a second, 180 WNW  $\times$  130  $\times$  2. A third, on left bank opposite first, is 300 WNW  $\times$  160  $\times$  2 (but with only the central portion rising to substantial ht.). Bricks 23, 27 cm sq. Trace of Uruk. Sasanian–Early Islamic—possibly Samarran.



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- 1186 Tell Abū 'Alayma. 160 diam.  $\times$  2.2. Sasanian–Early Islamic.
- 1187 — 180 WNW  $\times$  140  $\times$  4.5, on right bank of Shatt al-Nīl. Sasanian–Early Islamic.
- 1188 — An important town, recently and extensively looted, 1,050 NW  $\times$  630  $\times$  2.5. A broad swale, though not descending to plain level and continuously covered with sherds and other debris, separates the NW and SE halves of the site. The NW half, slightly higher and longer-lasting, has not been seriously disturbed. But the entire SE half has been almost continuously pitted. The SE end of the site remains somewhat ill defined owing to a continuous belt of dunes. Surface-level debris may continue in that direction for 500 to 800 m. Early Dynastic II/III. Mainly Akkadian. Ur III–Larsa occupation is limited to the higher, NW part of the site.
- 1189 — 300 NE  $\times$  200  $\times$  2.8. Sasanian–Early Islamic.
- 1190 — 100 diam.  $\times$  1. Sasanian.
- 1191 — 170 E  $\times$  110  $\times$  1.4. Sasanian–Early Islamic.
- 1192 — The central mound is only 60 diam.  $\times$  1.4, but surface debris tails off 150 m E and almost 500 m W. Sasanian. There is an unusual preponderance of storage jar sherds in the surface debris.
- 1193 Tell Mirza. 750 E  $\times$  600  $\times$  6.5. Parts of the site are only a little above plain level, but surface debris is dense and continuous. At plain level, moreover, debris also extends 200 m SE of site and for varying but generally shorter distances in other directions. Bricks on site preponderantly 33–36 cm sq., but also 27–30 cm sq. 50 m E, across an old, major canal bed is a second mound that is surely a continuation of the same site, 120 diam.  $\times$  2.2, and from here indistinct small mounds and hummocks of debris tail off SSE along a levee. An isolated small tower, now in ruins, stands 150 m NW of this second mound. Parthian confined to the canal levee passing between the two mounds and continuing SSE. Sasanian–possible (or at any rate, limited) Early Islamic.
- 1194 — 350 NW  $\times$  330  $\times$  0.5. Intensive collection made in circle of 5 m radius, center. Possible trace of Ubaid II. Primarily Early/Middle Uruk, limited Late Uruk. Also a very little Sasanian–Early Islamic.
- 1195 — 160 NW  $\times$  100  $\times$  1.2, with small hummocks and plain-level debris extending 600 m SE along old canal levee. 400 m NW is a second, 130 NW  $\times$  80  $\times$  0.2. Possibly a small Uruk site underlies the second mound. Sasanian–possible Early Islamic.
- 1196 — 130 E  $\times$  70  $\times$  0.2. Uruk. Mainly Old Babylonian–Cassite.
- 1197 — 140 E  $\times$  80  $\times$  0.2. Possible Middle–mainly Late Uruk. Jemdet Nasr–Early Dynastic I confined to a very small area at E end of site. Some Sasanian–Early Islamic.
- 1198 — 210 NNW  $\times$  160  $\times$  0.3. Intensive collection made in circle of 5 m radius, N central. Early Uruk. A small Jemdet Nasr resettlement is confined to the S end.
- 1199 — 190 diam.  $\times$  3. Early/Middle Uruk. Primarily Larsa–Old Babylonian.
- 1200 — 240 diam.  $\times$  0.8. Sasanian.
- 1201 — 160 NNE  $\times$  120  $\times$  1.4. Sasanian.
- 1202 — Perhaps 160 NW  $\times$  80, mostly at little more than plain level. The remains of a single small building (28 cm sq. brick) rise to 1 m. Sasanian–Early Islamic.
- 1203 — Part of the Tūlūl Ruwayjah group (cf. site 1226). 310 NW  $\times$  210  $\times$  2.4. Sasanian–Early Islamic.
- 1204 — 140 diam.  $\times$  1.8. Sasanian–Early Islamic.
- 1205 — 360 NW  $\times$  220. The summit of the main mound, toward its SE end, is 1.5 m. Later settlement apparently was concentrated at the NW end, however, and a more localized summit there can be described as perhaps 100 diam.  $\times$  2.2. Concentrations of large (13–17 cm) clay cones with inset heads for pigment are found on the surface just NE of main mound summit. Intensive collections in circles of 5 m radius: #1, main mound summit, SE; #2, NW central. Mainly Early–Middle Uruk. Probably Late Uruk. Jemdet Nasr–Early Dynastic I limited. The later, relatively small settlement on the NW end is Old Babylonian–Cassite.
- 1206 — 180 diam.  $\times$  1.8. Old Babylonian–Cassite, limited Sasanian.
- 1207 — 150 NNW  $\times$  110  $\times$  0.6. Trace of Uruk. Parthian–Sasanian.
- 1208 — 130 NNW  $\times$  100  $\times$  0.8. Probably a small, underlying Uruk site. Old Babylonian–Cassite.
- 1209 Qubur Hathōt. 280 NNW  $\times$  150  $\times$  2.8, but the low NNW end of site extends E to give it a somewhat triangular outline in plan. Trace of Uruk. Achaemenian–Parthian–Sasanian.
- 1210 — 130 diam.  $\times$  2. 150 m NNE, connected by a ribbon of plain-level debris, is a second mound 220 diam.  $\times$  1.6. A third, immediately W of the first, is 140 diam.  $\times$  0.6. Probably a small, underlying Uruk site. Trace of Ur III–Larsa. Sasanian–Early Islamic.
- 1211 — 160 NW  $\times$  120  $\times$  2.5. Parthian, the surface debris seeming to include an unusually high proportion of large, pointed-base storage jars.

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- 1212 — 160 NW  $\times$  120  $\times$  1. Sasanian-possible Early Islamic.
- 1213 — An irregular strip of settlement along both banks of the Shatt al-Nil above an important concentration of branch canal offtakes. The strip exceeds 1.5 km in length and is generally from 100 to 250 m in width. Parts of it are quite low, but several individual mounds exceed 4 m in ht. The radiating branches that fan out here strongly imply that there was once a regulatory weir. No surface evidence could be found for it, though there are several suggestive indications of sluice gates. Many 33 cm sq. bricks, particularly at downstream end, but 27 cm sq. are more common. Sasanian-Early Islamic. An intact jar was found buried in a thin casing of asphalt, rim at surface level, on main right bank mound just above offtake fan. Broken in antiquity, it was apparently set in asphalt to provide storage. This implies complete wind deflation of the building housing this jar.
- 1214 — 400 diam., low and rolling; hts. not exceeding 1.2 m. Sasanian-possibly also Early Islamic.
- 1215 — 300 NNW  $\times$  160  $\times$  0.3. Probable Jemdet Nasr. Early Dynastic I.
- 1216 — 220 N  $\times$  150  $\times$  3.5, with a low tail of debris extending E. 400 m SE is a second mound, 220 diam.  $\times$  0.2. Intensive collections within circles of 5 m radius on latter: #1, SE central; #2, NW central. Second mound: Possible Middle Uruk. Mainly Late Uruk. Jemdet Nasr much reduced. Very sparse Sasanian-Early Islamic. First mound: Neo-Babylonian-Achaemenian is localized on E tail. Mainly Sasanian-Early Islamic.
- 1217 Tell Dowayhis. At least 300 diam.  $\times$  10-13, but size obscured by dunes. 250 m SSW, across a broad old channel from the WNW, is a small outlier 70 diam.  $\times$  1.2. Uruk, Early Dynastic II/III-Larsa.
- 1218 — 120 diam.  $\times$  1. Old Babylonian-Cassite.
- 1219 — 240 NW  $\times$  200  $\times$  1.7. Trace of Uruk. Cassite-Parthian.
- 1220 — Three adjoining mounds form a N-S line 300  $\times$  160  $\times$  3. Sasanian-possibly also Early Islamic.
- 1221 — 130 diam.  $\times$  2.2. Trace of Uruk. Old Babylonian-Cassite, Sasanian-Early Islamic.
- 1222 — 260 E  $\times$  140  $\times$  2. Sasanian-Early Islamic, possibly continuing into Samarran.
- 1223 — 170 NE  $\times$  100  $\times$  2. Sasanian-possible Early Islamic.
- 1224 — Three tells adjoining a NE canal levee, each about 70 diam.  $\times$  1. Sasanian-possible Early Islamic.
- 1225 — 150 diam.  $\times$  2. Sasanian-possible Early Islamic.
- 1226 Tell Ruwayjah. 220 diam.  $\times$  2.6. Trace of Cassite. Sasanian-possible Early Islamic.
- 1227 — 300 NE  $\times$  220  $\times$  0.6. Sasanian-possible Early Islamic.
- 1228 — 80 diam.  $\times$  0.4. Sasanian-possible Early Islamic.
- 1229 — Eight semidetached mounds in an area 700 NE  $\times$  450; see base map for locations. The largest and highest, in the SW and SE, rise to 4 and 4.5 m respectively. Sasanian-possible Early Islamic.
- 1230 Part of Tell al-Laham; cf. site 1231. 160 diam.  $\times$  2, with a ruined qal'a near W end rising an additional 2.4 m. Lower debris, mainly from brick kilns, extends the area of the site considerably farther to the NE. While the site falls within, or at least very close to, the circle of outwash debris from site 1231, it is clearly detached from the rectangular town plan of the latter as seen on air photographs. Moreover, the sherd evidence argues that it should be considered a separate and for the most part later settlement. A small Early/Middle Uruk settlement here is likely. Old Babylonian. Mainly Cassite. Middle/Neo-Babylonian-Achaemenian, Recent.
- 1231 Tell al-Laham. 500 diam.  $\times$  7. While this circular form may best describe the present appearance of the site, however, the air photographs suggest a rectangular shape for the original town. Ur III-Larsa, Middle/Neo-Babylonian-Achaemenian-Parthian.
- 1232 — 120 diam.  $\times$  2.3. Seleucid-Parthian.
- 1233 — 130 diam.  $\times$  2.2. Trace of Uruk. Old Babylonian-Cassite.
- 1234 — 200 NW  $\times$  120  $\times$  0.5. Sasanian. There are rare sherds of Old Babylonian-Cassite and Seleucid-Parthian, but these are assumed to have been secondarily introduced from sites 1233 and 1232 respectively.
- 1235 Tell Abū Qubūr. 300 NW  $\times$  180  $\times$  3. 90 m SSW is a second, 160 NW  $\times$  130  $\times$  2. Cassite-Parthian.
- 1236 — 160 NW  $\times$  130  $\times$  2. Rare Cassite, primarily Neo-Babylonian-Achaemenian.
- 1237 Tell Dlehim. 700 NE  $\times$  630  $\times$  18, rising to this ht. only in a steep, zigguratlike summit in the WSW part of the site. The rest of the site is much lower, the most prominent mounds lying generally to the E and ENE and not exceeding 1.5-2.5 m. Beyond the dimensions indicated, aerial photographs indicate a possible further extension of the site to the ESE, across a modern canal, and other, more ancient canals also appear to have

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- been cut through the ruins as shown in the base map. Differences in soil color and compaction make it possible to trace an apparent street in the NE part of the site that is about 6 m in width and can be followed for several hundred meters leading in toward the apparent center of the city; it has at least one intersection with a narrower street leading laterally SSE. Poor drainage and high soil salinity make collecting conditions generally poor, and identifiable ceramic types are correspondingly scarce. The size of the site is such, however, that it was possible in time to assemble a sufficient collection from all parts of the mound to attach reasonable confidence to a dating estimate. Quite possibly, the major occupation of the site was in the Early Uruk and Jemdet Nasr periods, for indicators of these periods are numerous and very extensively distributed. The absence of beveled-rim bowls, on the other hand, may suggest a Late Uruk hiatus. Later surface material, to be sure, is also distributed virtually as extensively as the ruins themselves and is naturally more abundant. It suggests an Akkadian–Ur III or possibly Akkadian–Larsa range of occupation. A little Parthian pottery also occurs, concentrated around the high mound and perhaps representing no more than a small, late fortification built on its summit.
- 1238 Tell Khazir. 180 NW  $\times$  150  $\times$  3.5. The central summit is largely composed of fallen 21 cm sq. bricks. Sasanian–Early Islamic. Possibly there was a single, later building on the summit after the abandonment of most of the site.
- 1239 — 200 NW  $\times$  140  $\times$  1.8. A narrow ribbon of low debris continues NW for perhaps 700 m, virtually to site 1238. Sasanian–Early Islamic.
- 1240 — 230 NNE  $\times$  160  $\times$  2. Limited Akkadian–Larsa. Mainly Old Babylonian–Cassite.
- 1241 Tūlūl Abū Gharkha. 250 diam.  $\times$  3. Sasanian–possible Early Islamic.
- 1242 — 200 diam.  $\times$  1.8. A strip of low debris, varying in width from 20 to 120 m, extends 500 m NW from mound along an old canal levee. Sasanian–possibly Early Islamic.
- 1243 Qal'a Abū Gharkha. The ruined qal'a is 14 m square, the largest of its four corner towers rising 4.5 m on the SSW. Sparse pottery is found around it at plain level. Sasanian–Early Islamic, Recent.
- 1244 Tell al-Hraymsāt. 240 NNE  $\times$  180  $\times$  4.5. Profuse surface pottery. Akkadian–Larsa.
- 1245 Tell al-Hraymsāt. 260 NW  $\times$  150  $\times$  4.5. Neo-Babylonian–Achaemenian–Parthian.
- 1246 — Perhaps 150 diam.  $\times$  0.3, although partly obscured by dunes. Sasanian–Early Islamic.
- 1247 — 220 NW  $\times$  120  $\times$  0.2. Possible Uruk and Jemdet Nasr. Limited Early Dynastic I. Mainly Early Dynastic II/III. Very limited Akkadian–Larsa.
- 1248 — 250 diam.  $\times$  2. Neo-Babylonian–Achaemenian–Parthian.
- 1249 — 240 NW  $\times$  160  $\times$  3.5. Akkadian–Larsa, Cassite–Achaemenian. Possible Seleucid–Parthian.
- 1250 — 240 NW  $\times$  180  $\times$  1.8. Old Babylonian–Cassite.
- 1251 — 220 NW  $\times$  140  $\times$  3.6. Neo-Babylonian–Achaemenian–Parthian.
- 1252 — 140 diam.  $\times$  2.8, with a wide tail of lower debris extending more than 300 m NW. Seleucid–Parthian–Sasanian–possible Early Islamic.
- 1253 — 220 WNW  $\times$  160  $\times$  2.4. Achaemenian–Parthian.
- 1254 — 170 diam.  $\times$  1.5. Seleucid–Parthian–Sasanian.
- 1255 — 130 diam.  $\times$  4.5, surrounded and partly covered by dunes. Sasanian–Early Islamic.
- 1256 — 180 diam.  $\times$  2.6, completely surrounded by dunes. Larsa–Old Babylonian–Cassite.
- 1257 — 300 diam.  $\times$  6. At the N foot of the mound is an apparent cemetery area covering more than 1 ha. It has been very recently and extensively pitted. The cemetery is apparently Early Dynastic II/III–Akkadian, the mound Akkadian–Larsa.
- 1258 — 220 diam.  $\times$  4.8, with debris tailing off SE for more than 300 m. Sasanian–Early Islamic.
- 1259 — 250 NNW  $\times$  140  $\times$  1.2. Akkadian–Ur III–Larsa–Old Babylonian–Cassite. There is also a little Sasanian–Early Islamic, but not enough to assure a primary settlement here.
- 1260 — 130 NNE  $\times$  60  $\times$  0.8. Immediately SSE is a second of the same size. 50 m NW is a third, 40 diam.  $\times$  1.8. Sasanian–Early Islamic.
- 1261 — 110 N  $\times$  70  $\times$  0.2. Intensive collection made in circle of 5 m radius, N center. Possible Middle Uruk, mainly Late Uruk.
- 1262 — 400 NW  $\times$  280  $\times$  4. Sasanian–Early Islamic.
- 1263 — 80 NNW  $\times$  70  $\times$  2, tailing off SSE in low debris. 60 m ENE across an old canal junction is a second, 180 WNW  $\times$  100  $\times$  1.8. Parthian–Sasanian. Storage jar fragments are heavily represented in the surface materials at the first mound, brick-kiln refuse at the second.
- 1264 — 420 E  $\times$  160  $\times$  2.5. Neo-Babylonian–Achaemenian–Parthian.
- 1265 — 250 diam.  $\times$  1.8. To the W is a second area of debris, 120 diam.  $\times$  0.3. In addition, a 50 m wide band extends 200 m SE from the main mound along an old canal levee. Sasanian–Early Islamic.
- 1266 — 240 ENE  $\times$  140  $\times$  2. Sasanian–Early Islamic.



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- 1267 — 180 diam.  $\times$  1.8. Old Babylonian–Cassite.
- 1268 — 250 NW  $\times$  150  $\times$  2.6. Sasanian–Early Islamic.
- 1269 — 180 diam.  $\times$  2.2. Seleucid–Parthian.
- 1270 — 320 NE  $\times$  130  $\times$  2.2. Neo-Babylonian–Achaemenian–Seleucid–Parthian.
- 1271 — Perhaps 130 diam.  $\times$  3, although drifted sand around base of mound may conceal low extensions. Early/Middle Uruk, Early Dynastic II/III–very limited Akkadian.
- 1272 — 350 ENE  $\times$  170  $\times$  5. Trace of Uruk, Neo-Babylonian–Achaemenian–Parthian.
- 1273 Tell Dhahiya. Continuous debris, multiple contiguous summits suggest a roughly square area of settlement, 700 m sides oriented NW and NE. The main conical summit rises to 8.5 m. Sasanian–Early Islamic.
- 1274 — 300 diam.  $\times$  2.2, with a slight elongation to the W. Sasanian–Early Islamic.
- 1275 — A square mud-brick enclosure, 90 m sides oriented NW and NE, wall stubs still standing 3 m high. Only Sasanian–Early Islamic pottery was seen, although the condition of the walls argues that the enclosure itself is Recent.
- 1276 — 300 diam.  $\times$  4, tailing off 500 m SW. 600 m farther SW is a small outlier, 200 NW  $\times$  140  $\times$  1.8. Sasanian–Early Islamic.
- 1277 — 180 diam.  $\times$  1. Sasanian–possible Early Islamic.
- 1278 — 300 WNW  $\times$  220  $\times$  3.4. Very limited Uruk, Early Dynastic I. Primarily Akkadian–Cassite. Sasanian storage jar sherds may reflect the use of the mound at that time only as a cemetery.
- 1279 — 160 diam.  $\times$  2.5. Larsa, Sasanian–Early Islamic.
- 1280 — Eight mounds around a major canal junction, within an area 700 NE  $\times$  450 and with hts. up to 3 m. But settlement was certainly not continuous, as plain-level debris is sparse, and canal spoil banks also may exaggerate the apparent size of the site. Sasanian–Early Islamic.
- 1281 — 180 E  $\times$  90  $\times$  1.6. Sasanian–Early Islamic.
- 1282 — 190 diam.  $\times$  1.4. Neo-Babylonian–Achaemenian–Parthian.
- 1283 — 70 diam.  $\times$  0.8, bisected by an old canal from NW. Achaemenian–Parthian.
- 1284 — About 250 diam., sparse and discontinuous plain-level debris interspersed by eight low hummocks with denser sherd accumulations. Early/Middle Uruk. Primarily Cassite–Achaemenian.
- 1285 — 140 E  $\times$  70  $\times$  2. Sasanian–Early Islamic.
- 1286 — 400 NW  $\times$  140  $\times$  3. Sasanian–Early Islamic.
- 1287 — 260 diam.  $\times$  4. 140 m NW is a second, 160 diam.  $\times$  2.2. Sasanian–Early Islamic.
- 1288 — 120 E  $\times$  90  $\times$  2.8. Sasanian–Early Islamic.
- 1289 — 220 NNW  $\times$  140  $\times$  3.4. 40 m E is a second mound, 180 diam.  $\times$  1.4. Sasanian–Early Islamic. The later period is seemingly less well represented on the second, lower mound.
- 1290 — 740 E  $\times$  160 (W end)–240 (E end)  $\times$  3.5. Akkadian–Larsa.
- 1291 — 210 N  $\times$  140  $\times$  2.5. Trace of Uruk. Neo-Babylonian–Achaemenian.
- 1292 — 200 diam.  $\times$  1. Sasanian.
- 1293 Tell Abū Dhabā'. 550 E  $\times$  280  $\times$  4.2, but both ground observation and air photographs suggest a pair of adjoining tells on an E–W line rather than a single elongated settlement. The site is approached from the W by a straight, clearly defined bed that continues E beyond it. Several probably lateral offtakes from this canal now take the form of curious low ridges capped with pottery. Probably this implies considerable wind deflation of the land surface in this vicinity, to the point where sherds in abandoned canal branches provided a protective cap over underlying sediments and ultimately left raised ribbons of debris instead of incised channels. Sherds indicating a possible Middle/Late Uruk occupation are concentrated, although not completely localized, in the wide, low saddle between the two adjoining mounds. The remainder of the site was more or less continuously occupied from Akkadian through Parthian times, with Larsa, Cassite, and Parthian the dominant surface components. Possibly, however, the E mound was in use primarily as a cemetery in the Neo-Babylonian, Achaemenian, and Parthian periods.
- 1294 — 110 E  $\times$  80  $\times$  3.2. Centered on the mound are traces of a rectangular enclosing wall 70 E  $\times$  40, with irregularities in profile suggestive of corner towers at least on the SW and SE. On the summit of the mound, centered within this enclosure, is a similarly oriented square structure of 31–33 cm sq. baked brick, 10 m on a side. The S half of the summit has eroded down to the foundations of this structure, but it seems possible that it was approached on the W and perhaps N by stairways of baked brick. At the NW and NE corners of this inner, square structure there are projecting towers. Entrances through its 93–96 cm thick walls are placed at the N end of the W side and in the middle of the N side; both are 90 cm wide. Early/Middle Uruk, Larsa–Old Babylonian are primary periods associated with habitation of the mound itself. The overlying structure is of Sasanian date and may represent a fire temple.
- 1295 — 140 NNW  $\times$  90  $\times$  2.2. Neo-Babylonian–Achaemenian–Parthian.

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- 1296 — 100 diam.  $\times$  1.8. Sasanian—possible Early Islamic.
- 1297 — Three small tells, probably separated by canals, form an ENE line  $220 \times 120 \times 1$ . Sasanian.
- 1298 —  $320 \text{ N} \times 90 \times 1$ . Sasanian—possibly also Early Islamic.
- 1299 —  $220 \text{ E} \times 140 \times 1$ , bisected by an old (but probably later than the site) canal from the N. Old Babylonian—Cassite.
- 1300 —  $210 \text{ NNW} \times 90 \times 0.8$ . A second, much smaller mound is 20 m WSW. Sasanian—possible Early Islamic.
- 1301 — 130 diam.  $\times$  1. Cassite—Achaemenian.
- 1302 — 90 diam.  $\times$  0.8. Sasanian—possible Early Islamic.
- 1303 —  $120 \text{ NW} \times 1.8$ . Trace of Uruk. Larsa.
- 1304 Also known as Tell al-Hayyad (cf. site 1306).  $240 \text{ diam.} \times 2.6$ . Probably a small, underlying Uruk site. Akkadian—Larsa.
- 1305 — 140 diam.  $\times$  1. 80 m W is a second, 70 diam.  $\times$  0.1. A third, 50 m SW of first, is 80 diam.  $\times$  0.3. Neo-Babylonian—Achaemenian.
- 1306 Tell al-Hayyad.  $1100 \text{ NE} \times 450$ , although divided into unequal components by the cutting of later canals, as the air photographs and map show. The SE part of the mound is largest in area but reaches only 4.5 m ht. The central section is 7 m high, and the NE part, the smallest, is 5 m. Dense piles of a limited number of types of mass-produced, utilitarian pottery abound all over the site. This, together with the problem of a later overburden, led me to record types on a presence-absence basis rather than make several intensive collections. Early Uruk types are most extensively distributed, around the entire perimeter and lower slopes of the site. The large, central summit area of the SW part of the site is overwhelmingly Jemdet Nasr, although numerous examples of Early and Late Uruk types also occur. There is also a much more limited distribution here of Early Dynastic I pottery. All the same types occur on the central and NE portions of the mound, but the additional ht. there reflects smaller, late occupations: Neo-Babylonian—Achaemenian—Parthian. Parthian slipper coffins, but probably no real settlement, occur on the SW portion as well.
- 1307 — Perhaps 250 diam.  $\times$  0.8, although partially obscured by surrounding dunes. Old Babylonian—Cassite.
- 1308 — 180 diam.  $\times$  2.8. Later canals cut through the mound have left three distinguishable summits in an E—W line, the highest on the W. Primarily Ur III—Larsa, limited Old Babylonian.
- 1309 —  $260 \text{ NW} \times 180 \times 2.2$ . 500 m NW is an evident bifurcation in the ancient riverbed, one sinuous channel passing E of this site (and perhaps of Early Dynastic I date), the other W. Akkadian—Larsa.
- 1310 —  $1,100 \text{ NW} \times 450 \times 5$ . Adjacent SE is a second,  $250 \text{ NW} \times 190 \times 3$ . Much smaller mounds also occur on the opposite (right) bank of ancient watercourse passing through the W part of the main site. Many 21 cm sq. bricks. Sasanian—Early Islamic; the 21 cm bricks may suggest a somewhat longer continuation.
- 1311 — 280 diam.  $\times$  4. Limited Cassite. Mostly Neo-Babylonian—Achaemenian—Parthian. Some Sasanian graves.
- 1312 — 50 diam.  $\times$  0.2. Intensive collection made within circle of 5 m radius, N central part of site. Early/Middle Uruk, possibly also a small Late Uruk occupation.
- 1313 —  $250 \text{ NNW} \times 150 \times 2.4$ . Sasanian—Early Islamic.
- 1314 — 300 diam.  $\times$  2. Sasanian. Early Islamic rare if present at all.
- 1315 —  $190 \text{ NW} \times 150 \times 0.4$ , the limits of the site perhaps slightly reduced by surrounding dunes. Intensive collection made in circle of 5 m radius, center, supplemented by types observed elsewhere that are noted only on a presence-absence basis. Probable Middle Uruk, mainly Late Uruk. Jemdet Nasr occupation largely concentrated around a kiln area in the S part of site.
- 1316 —  $250 \text{ NNW} \times 180 \times 3$ , with a low NNW extension. Small Uruk and Jemdet Nasr—Early Dynastic I occupations. Mainly Sasanian—Early Islamic.
- 1317 — 180 diam.  $\times$  2. Possible Early Dynastic II/III. Primarily Larsa—Cassite. Relatively few Parthian sherds, and these may be only graves or strays from adjoining settlement at site 1318.
- 1318 — Tell al-Hayyad al-'Alwī. 300 diam.  $\times$  7. Uruk, Larsa—Cassite. But surface materials are overwhelmingly Neo-Babylonian—Achaemenian—Parthian.
- 1319 —  $120 \text{ NW} \times 60 \times 0.8$ . Late Islamic—Recent.
- 1320 — Tell Jumayda.  $250 \text{ WNW} \times 80 \times 2.3$ . Cassite—Middle Babylonian.
- 1321 Tell Abū Wādiya.  $180 \text{ NE} \times 140 \times 1.2$ . Middle—Neo-Babylonian. Minor Recent occupation.
- 1322 Tell Abū Dukhun. From Inspectorate of Surveys records, file 67, register 2126. Recorded as Cassite, Parthian.
- 1323 Farkh Abū Dukhun. From Inspectorate of Surveys records, file 68, register 2126. Recorded as Old Babylonian—Cassite.
- 1324 —  $110 \text{ E} \times 40 \times 0.3$ . Adjoining to the S is a

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- second, 100 NW  $\times$  30  $\times$  0.4. Cassite-Middle Babylonian.
- 1325 Ishān Sayyid Ridha, 340 E  $\times$  260  $\times$  4.2, Cassite-Middle/Neo-Babylonian.
- 1326 Mellahe (name taken from Samawa 3E sheet, "Rough Provisional Issue" of British  $\frac{1}{4}$ " map series, Survey of India Offices, 1916). Ruins extend more than 500 m along the outer curve of a meander in a former watercourse. The only elevated part of the site, however, is a mound 250 N  $\times$  180  $\times$  3 (at both N and S ends) situated immediately NE of the apex of the meander. Here there is a small reed-mat shrine, now in ruins. Trace of Cassite (probably only strays from nearby site 1325), mainly Sasanian on the mound. The larger, lower site is primarily or exclusively Recent, and some Recent pottery naturally also occurs on the mound. Cf. discussion of this settlement by Loftus (1856, pp. 141-43).
- 1327 Ishān Danghuz. 150 NE  $\times$  110  $\times$  3. Late Islamic.
- 1328 — 140 diam.  $\times$  3. Sasanian, possibly also Early Islamic, Recent.
- 1329 Tell al-Ahmar. 220 NW  $\times$  120  $\times$  3.5. 40 m S across an old canal levee is a second, 180 NW  $\times$  150  $\times$  2.8. Late Islamic.
- 1330 — 250 NW  $\times$  180, the summit of 3.5 m at SE end. NNE across an old canal bed is a second, 120 diam.  $\times$  1. 200 m ESE of the second, and also on the left bank of the canal, is a third, 300 N  $\times$  160  $\times$  1. Late Islamic.
- 1331 — 100 NW  $\times$  40  $\times$  0.2. Old Babylonian-Cassite.
- 1332 — A large ruined qal'a, the ruins of its four corner towers still rising to 4.5 m ht. The accompanying settlement is 450 diam., although mostly represented by debris at little more than plain level. Recent.
- 1333 Tell Tabīya. 220 diam.  $\times$  7. A ruined qal'a is on N slope of mound, an isolated tower NE. Larsa. Primarily Old Babylonian. Rare Cassite. Recent.
- 1334 — 170 ENE  $\times$  130  $\times$  0.4. Sasanian, possibly also Early Islamic.
- 1335 — 180 E  $\times$  80  $\times$  2. Sasanian.
- 1336 Ishān Burhayniyah. From Inspectorate of Surveys records, file 211, register 2295. Recorded as Islamic.
- 1337 Tell Khathale. A prominent qal'a is centered on this mound, the former an irregular quadrilateral 55-70 m on a side that rises to a maximum ht. of 6.5 m at its NE corner. The underlying mound is 240 diam. A small Early Uruk settlement. Primarily Early Dynastic II/III-Akkadian, limited Ur III-Larsa-Old Babylonian. A substantial Recent occupation.
- 1338 Sūq al-Fawwar. Main mound 180 NW  $\times$  50  $\times$  1.2, littered with fragments of 21 cm sq. (and smaller) bricks. Walls or wall footings observed in place, giving the impression that a considerable part of this mound may cover a single large building. To the SE, the site continues at plain level for several hundred m more, mixed with and interrupted by canal spoil banks so that its full dimensions are hard to determine. This lower part of the site clearly forms a wider band of settlement than the width suggested by the main mound, however, and has denser accumulations of sherds suggesting the ordinary accumulation of living debris rather than the sparser accumulation in and around formal architecture. Late Islamic (especially the main mound)-Recent (especially the lower settlement to the SE). Cf. Loftus 1856, pp. 142-43 (quoted in Adams and Nissen 1972, p. 80) for a description of the ruins of this town about a quarter-century after its reported abandonment.
- 1339 — 220 NNE  $\times$  110  $\times$  2. Larsa-Old Babylonian-Cassite.
- 1340 Tell Ghanīme. 250 WNW  $\times$  110  $\times$  2.6, although most of the site is low except for a ruined building of baked brick at E end. Larsa-Achaemenian, Recent.
- 1341 — 80 diam.  $\times$  1.5. Vestigial remains of a ruined qal'a. Old Babylonian-Cassite, Recent.
- 1342 — 200 N  $\times$  140  $\times$  1.8. 300 m ENE is a second mound, 130 diam.  $\times$  0.6, with scattered, low outcrops of debris across intervening plain. Larsa-Old Babylonian, Recent.
- 1343 — 180 diam.  $\times$  2, with scattered debris at plain level NE and a smaller, lower summit SE. Sasanian.
- 1344 Muftul Sayyid. 60 diam.  $\times$  2, with a solitary ruined tower rising 3 m more. Sasanian, Recent.
- 1345 — 120 NW  $\times$  70  $\times$  0.9. 40 m SW is a second mound, 50 diam.  $\times$  1. The second mound is mainly Old Babylonian-Cassite, the first is mainly Recent. Each has slight admixtures of the other's pottery, which are assumed not to represent primary settlement.
- 1346 — A prominent ruined qal'a, oriented WNW-NNE and about 25 m square. It has three towers, lacking one only on WNW. 40 m S is a mound, 160 N  $\times$  110  $\times$  0.8. 60 m WSW of the latter is another, 200 N  $\times$  80  $\times$  2.2. The mounds are primarily Old Babylonian-Cassite, and some of the same pottery is found on the lower slopes of the decomposed walls of the qal'a—perhaps having eroded out of the mud brick. There is also Recent pottery around the qal'a.
- 1347 — 170 NNW  $\times$  70  $\times$  2. 20 m SW is a second mound, 80 NW  $\times$  30  $\times$  0.2. The lower mound is

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- primarily Larsa–Old Babylonian–Cassite, the main one Recent. A few early sherds also are found on the main mound, however, primarily in possible canal spoil banks along its lower sides.
- 1348 — 70 NW  $\times$  30  $\times$  0.2, although the site may extend for a moderate distance to the NE under a dune now bordering it in this direction. Larsa–Old Babylonian.
- 1349 — 180 NW  $\times$  100  $\times$  2.3. Larsa–Old Babylonian–Cassite. Possible Neo-Babylonian. Recent.
- 1350 — 90 diam.  $\times$  2. Adjoining NNE and E are areas of low debris of equal size to the mound. SE is a larger but less noticeable mound: 200 diam., rising in one hummock to 1.3 but mostly 0.7 or less. Neo-Babylonian–Achaemenian, possible Seleucid–Parthian. Recent.
- 1351 — 80 N  $\times$  30, plain-level debris. Larsa–Old Babylonian–Cassite.
- 1352 — 200 diam.  $\times$  5. Very saline; surface pottery limited. Old Babylonian–Cassite sherds were noted in fields just N of site, but not on mound itself. Their absence may be only a reflection of the poor collecting conditions. In any case, mainly Sasanian–Early Islamic.
- 1353 — 260 NW  $\times$  160  $\times$  3. An apparent street 3 m in width can be traced running NE from near the summit of the mound for about 60 m, and there is an area of ancient pottery kilns at the NE end of the site. Middle/Late Uruk–Jemdet Nasr.
- 1354 Tell Imām Sayyid Mohammed. 280 NW  $\times$  180  $\times$  3.5. On the summit of the mound is a small square shrine with a conical blue dome and a nearby attendant's hut. Surface pottery is extremely sparse. Possible Jemdet Nasr, although the few sherds involved are more likely to have been secondarily transported from nearby site 1353. Akkadian–Larsa, Recent.
- 1355 — 250 NW  $\times$  120  $\times$  2.5. Poor collecting conditions. Middle/Late Uruk–Jemdet Nasr.
- 1356 Tell al-Dhubay'ah. 160 diam.  $\times$  3.5. Possibly a Jemdet Nasr occupation. Mainly Sasanian, Recent.
- 1357 Also known as Tell al-Dhubay'ah. 110 diam.  $\times$  4.5. Extremely poor collecting conditions; criteria for dating somewhat doubtful. Late Uruk–Jemdet Nasr. Recent.
- 1358 Tell al-Hiz. 130 diam.  $\times$  6, with a ruined qal'a on the S end of the mound and perhaps the remains of a small hamlet farther N. Extremely poor collecting conditions. Trace of Uruk. Jemdet Nasr–Early Dynastic I. Recent.
- 1359 — 160 diam.  $\times$  1.5. Old Babylonian–Cassite.
- 1360 Ishān al Ahimar. 180 NW  $\times$  150  $\times$  3. Middle/Late Islamic.
- 1361 — 160 diam.  $\times$  2.4. 100 m NNW across an old canal levee is a second, 140 NW  $\times$  80  $\times$  2.8. 450 m NW of the first is a third, 80 diam.  $\times$  1. Middle/Late Islamic.
- 1362 — 130 diam.  $\times$  2. Middle/Late Islamic.
- 1363 — 350 WNW  $\times$  250  $\times$  5.5. Middle/Late Islamic.
- 1364 — 120 diam.  $\times$  0.5. Late Islamic.
- 1365 — 130 diam.  $\times$  0.4. Cassite.
- 1366 — 360 NW, a strip of settlement along an old canal bed that varies in width from 10 to 160 m. It is mostly low, but one hummock reaches 1.4 m. Late Islamic.
- 1367 — Strip of settlement on the right bank of a former canal, 280 NW  $\times$  80–140; mostly low, but two summits reach 1.5 m ht. On NE or left bank, directly opposite, is only a very low and narrow strip of settlement, but it continues SE for 300 m farther and widens at that point to 120 m. Late Islamic.
- 1368 — A strip of ancient settlement extending for 1,100 m along right bank of levee, varying in width from 80 to 150 m and reaching a maximum ht. of 1.5. A small left-bank settlement is directly opposite at approximately the midpoint. Late Islamic.
- 1369 — 300 diam.  $\times$  1.8. Late Islamic.
- 1370 — 240 diam.  $\times$  1.4, with scattered mounds of moderate size continuing to SE along left bank of former canal. Late Islamic.
- 1371 — Ruined qal'a, eroded into a shapeless low mound, and small surrounding settlement. Recent.
- 1372 Tell Bayjat. 300 E  $\times$  90  $\times$  2. 400 m W lies a second, 130 diam.  $\times$  0.8; immediately W of it a third, smaller but of the same ht. On the first, highest mound, trace of Uruk; Larsa–Old Babylonian–Cassite, Sasanian, Recent. The two smaller mounds are Sasanian.
- 1373 — 100 diam.  $\times$  2.2. There is an equivalent area of debris at plain level 250 m S. Cassite–Middle Babylonian.
- 1374 — 120 diam.  $\times$  2.2. Sasanian–Early Islamic.
- 1375 — 60 NW  $\times$  30  $\times$  4. Early ceramics curiously pulverized, heavily overlain by later debris, precluding an intensive collection. Hence early types are recorded on a presence-absence basis only. 20 m NE is a low and somewhat discontinuous area of debris, 100 NW  $\times$  100  $\times$  40. The main mound is Middle/Late Uruk, Recent. The low area is Sasanian.
- 1376 — 180 NNE  $\times$  120  $\times$  1.4. Old Babylonian–Cassite.
- 1377 — 40 diam., debris at plain level. Seleucid–Parthian.
- 1378 Ishān Abū Sabkhāya. Five adjoining mounds grouped in a shallow U open to the NW. They vary from 60 to 120 m in diam. and reach a maximum ht. of 3 m at NNE end. Sasanian.

- 1379 Ishān al-Hutaimiya, but cf. discussion of naming ambiguities in connection with site 1389. 220 WNW  $\times$  140  $\times$  2.2. Rare Cassite, mainly Middle/Neo-Babylonian, rare Achaemenian.
- 1380 — 150 diam.  $\times$  0.6. 300 m NNW of the first is a second, 100 NW  $\times$  70  $\times$  0.6. A third, 200 m NE of the first, is 60 diam.  $\times$  0.8. The third is Parthian, the first and second are Sasanian.
- 1381 — 180 E  $\times$  120  $\times$  0.5. Larsa-Old Babylonian, Sasanian.
- 1382 — 180 NW  $\times$  130  $\times$  0.4. Sparse pottery. Sasanian.
- 1383 Ishān Bayt. 350 NW  $\times$  300  $\times$  3. The substantially elevated portion of the mound is smaller than these dimensions, which reflect the limits of a bare, perceptibly raised mound surface set in a level, grassy plain. To some degree the lateral extent may be exaggerated by slope wash, in other words, although progressively sparser sherds and other debris do occur over the entire raised surface and seem unlikely to have been moved very far outward and downward by the same erosional agency. Probably a small, underlying Uruk settlement. Extensive Early Dynastic II/III, less Ur III-Larsa. Trace of Cassite. Mainly Achaemenian-Parthian.
- 1384 — 170 diam.  $\times$  1.5, with a small, ruined tower on NW end. Sasanian, Recent.
- 1385 Muftul Abū Duhn. Small, low settlement. Recent.
- 1386 To Walter Andrae at the beginning of the century, this was apparently "Abu Howasiduh" (Andrae 1903, map), perhaps now to be transcribed Abū Khowaysidah. There were no local informants in the vicinity at the time of our visit in 1975, and the continuing use of this name could not be confirmed. 180 diam.  $\times$  1. Perhaps a small Early/Middle Uruk settlement. Jedmet Nasr, possible Early Dynastic I/II/III-Akkadian-Ur III-Larsa. Some Sasanian, Recent.
- 1387 Probably Abū Khowaysidah; cf. site 1386. 180 diam.  $\times$  2.4. Late Islamic.
- 1388 — 100 E  $\times$  70  $\times$  0.8. Late Islamic.
- 1389 Umm al-Khezi. A brief excursus may be appropriate here on the inadequacy of names as reference points even for important sites like this one. We were able to obtain this name only after asking a number of local informants whose flocks were grazing in the immediate area. In Walter Andrae's time (Andrae 1903), however, this was apparently known as Hetime, for a large site with that name can be located in approximately the same position on his map, "Umgebung von Fara une Abu Hatab." That name in turn is presumably equivalent to site 1379 in this study, Ishān al-Hutaimiya, the identification given in the 1/4" map series and still current today. Umm al-Khezi, to Andrae (Umm al-Hizzi on his map) was a recently abandoned settlement that probably is equivalent to our site 1393. The obvious lesson is that only geographical coordinates, not names, constitute a permanent and unambiguous basis for site identification.
- 670 E  $\times$  400  $\times$  2.8, although some of the many individual summits making up this site may be slightly higher. It appears that the higher parts of the site are generally toward its peripheries, and that the outer slopes were in many cases steep-sided. This suggests the possibility of a city wall. Larsa-Old Babylonian-Cassite-Middle Babylonian. Cassite (and to a lesser degree, earlier) sherds are abundant everywhere, but later debris is generally limited to the E portion of the site.
- 1390 — 180 NW  $\times$  140  $\times$  1.9. Old Babylonian-Cassite-Middle Babylonian.
- 1391 — 100 N  $\times$  70  $\times$  1.8. Late Islamic.
- 1392 — 240 E  $\times$  190  $\times$  2. 150 m SE is a second, 80 diam.  $\times$  0.8. There has been recent, shallow pitting for graves on the lower mound. Old Babylonian-Cassite-Middle Babylonian.
- 1393 — (Possibly Andrae's Umm al-Khezi, where he noted a ruined qal'a.) 70 diam.  $\times$  2.8. Immediately E is an area of low debris, 180 NNE  $\times$  60. Some Sasanian, mainly Late Islamic.
- 1394 Again a confusion of names; cf. site 1389. This is probably the mound Loftus identified as Djemideh (1856, p. 143), a name now identified with site 1320. To Andrae a half-century later, on the other hand, it was Ishān al-Sahīn. There were no local informants in the vicinity from whom to obtain a modern name. 350 ENE  $\times$  220  $\times$  2.5. Very extensively, deeply, and recently pitted. Immediately W is a second, very small mound. Primarily Late Uruk-Jemdet Nasr. A small Old Babylonian-Cassite occupation is limited to the NE part of the site. The small mound to the W is Sasanian.
- 1395 — 160 diam.  $\times$  3. Badly pitted, probably because of its immediate proximity to site 1394. Sasanian, Late Islamic.
- 1396 — 140 E  $\times$  50  $\times$  1.7. 40 m N is a second mound, 50 diam.  $\times$  1.7. Late Islamic-Recent.
- 1397 — 130 diam.  $\times$  2.8. Two additional, very small, low mounds lie 120 m SE. The first mound is primarily Old Babylonian-Cassite. The others are Sasanian, and there is a little Sasanian debris on the first mound also.
- 1398 — 130 NE  $\times$  40  $\times$  0.7. 200 m SSW is a second, 100 diam.  $\times$  0.7. Sasanian.
- 1399 Tell Qal'a Badyar. 350 diam.  $\times$  2. Trace of Uruk. Old Babylonian-Cassite.

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- 1400 — 260 diam.  $\times$  2.2. Old Babylonian–Cassite.
- 1401 — 160 NNW  $\times$  90  $\times$  0.3. Cassite–Middle Babylonian.
- 1402 Tell al-Hibba. 250 N  $\times$  130  $\times$  0.8. A ruined qal'a on the summit rises 2 m more. There is an abandoned village immediately S of the mound. Pottery sparse. Sasanian–Early Islamic, Recent.
- 1403 — 80 diam.  $\times$  0.3. Cassite–Middle/Neo-Babylonian.
- 1404 — 450 NNW  $\times$  220  $\times$  2. Old Babylonian–Cassite localized at SSE end. Mainly Middle Babylonian–Parthian.
- 1405 — 340 NNW  $\times$  240  $\times$  2.4. Trace of Uruk. Old Babylonian–Cassite.
- 1406 Ishān al-Hōwa. 280 NE  $\times$  140  $\times$  2.5, with a ruined qal'a on the SW end rising an additional 3.5 m. There is a small mound 40 m SW. Another, 60 m NE, is 180 diam.  $\times$  2.4, with a sayyid's grave marked by a blue flag. Sasanian–Early Islamic, Recent, the latter concentrated on the first mound.
- 1407 Tell Abū Thayla. 200 diam.  $\times$  2, with a smaller mound to the S. A ruined qal'a forms a conical landmark rising 5 m above W end. Sasanian, Recent.
- 1408 Tell Khayyal. 200 diam.  $\times$  1, with a ruined qal'a rising an additional 2.5 m on SSE end. Sasanian–Early Islamic.
- 1409 — 550 NW  $\times$  180  $\times$  0.8. The NW half of the site is Old Babylonian–Cassite, Sasanian–Early Islamic. The SE half was apparently occupied only during the Sasanian–Early Islamic periods.
- 1410 — 120 diam.  $\times$  0.6, with a few higher hummocks, and with debris also tailing off 70 m NNW. Trace of Early Dynastic I. Old Babylonian–Cassite. Achaemenian–Parthian, limited Sasanian.
- 1411 — 130 N  $\times$  70  $\times$  2. Old Babylonian–Cassite.
- 1412 — Perhaps 250 diam., mostly at little more than plain level but with a small mound near W edge rising 2 m. Limits are partly obscured by dunes. Old Babylonian–Cassite, Parthian.
- 1413 — 90 diam.  $\times$  0.4. Trace of Uruk. Very limited Cassite. Mainly Middle/Neo-Babylonian.
- 1414 Tell Mu'azzam. 220 diam.  $\times$  0.8. A ruined qal'a 11 m square, with four corner towers (the largest to the N), rises 4 m above NW end. Sparse pottery. Old Babylonian–Cassite, Recent.
- 1415 — 250 diam.  $\times$  2. Sasanian–Early Islamic.
- 1416 — 100 NW  $\times$  60  $\times$  0.8. A ruined qal'a at NW end rises 4 m farther in ht. Owing to heavy admixture of later debris, the early material on this mound was scattered, fragmentary, and perhaps not wholly representative of the character of the underlying levels. Hence the enumeration of the collected sample, drawn from all parts of the mound instead of from a delimited area, may not be entirely comparable with other enumerations. Ubaid II, Early Uruk, possibly Middle Uruk, Sasanian, Recent.
- 1417 Tell Sukheri. About 700 NNW  $\times$  200, although possibly a sprawling cluster of tells rather than a single settlement. Individual mounds are 2 m or less in ht. A prominent ruined qal'a, 18 m square and oriented N, has four large corner towers rising 6 m above the SE end of site. Sasanian–Early Islamic. Limited Recent occupation.
- 1418 — 200 NNW  $\times$  140  $\times$  0.9. Old Babylonian–Cassite.
- 1419 — 180 diam.  $\times$  2, although the limited part of the mound with any significant elevation consists mainly of brick-kiln debris. Neo-Babylonian–Achaemenian.
- 1420 — 300 NW  $\times$  150  $\times$  2. Recently and extensively, if shallowly, pitted. Early Dynastic II/III–Akkadian, limited Ur III–Larsa.
- 1421 — 1,100 NW  $\times$  150–200  $\times$  1.3 or less. Slightly sparser debris continues farther NW at little more than plain level, directly adjoining and perhaps underlying site 1311. Probable Jemdet Nasr. Early Dynastic I.
- 1422 — 240 NW  $\times$  120  $\times$  1. A short distance farther NW are two very small conical mounds, largely consisting of fallen bricks, that rise to a slightly greater ht. Sasanian–Early Islamic.
- 1423 — 300 NW  $\times$  250, one small mound rising to 1.5 m but mostly debris at plain level. Early Dynastic II/III–Akkadian–Ur III–Larsa.
- 1424 — 500 NW  $\times$  180 (SE)–220 (NW)  $\times$  3. Sasanian–Early Islamic (similarity of surface materials to 1432 noted).
- 1425 — 240 diam.  $\times$  2.5. Old Babylonian–Cassite.
- 1426 — 750 WNW  $\times$  300  $\times$  3, although W and S portions of site may be partly obscured by a massive dune belt that overlies (and probably is largely derived from) levee deposits. Early Dynastic II/III. Mainly Akkadian. Some Ur III–Larsa.
- 1427 — 200 NW  $\times$  140  $\times$  2.8. Sasanian–Early Islamic.
- 1428 — 140 diam.  $\times$  1.2, cut by a later canal. Uruk–probable Jemdet Nasr–Early Dynastic I. Cassite–Middle Babylonian. Limited Sasanian.
- 1429 — 180 diam.  $\times$  2.5, cut by a later canal. Middle/Neo-Babylonian. Limited Parthian pottery may only reflect use of the mound as a cemetery.
- 1430 — 220 NW  $\times$  180  $\times$  2.5. An apparently later canal cuts through the SW portion of the site. Probable Jemdet Nasr. Early Dynastic I. Cassite–Middle Babylonian. Limited Sasanian.

- 1431 — 140 diam.  $\times$  0.8. The clear, raised traces of an ancient canal levee that could be unambiguously followed from site 1314 through site 1430 are lost a short distance above this site. Rare Cassite. Middle/Neo-Babylonian–Achaemenian–Parthian.
- 1432 — 500 NW  $\times$  350  $\times$  4. 400 m E is a second, much smaller mound, 170 ENE  $\times$  100. The latter is mostly about 0.4 in ht. but rises to about twice this amount in spoil banks around a few scattered, small robber pits. The main mound is Sasanian–Early Islamic. The small mound to the E is Early/Middle/Late Uruk. There are a few Sasanian–Early Islamic sherds on the small mound as well.
- 1433 — 230 E  $\times$  130  $\times$  0.4. Sasanian.
- 1434 — 250 diam.  $\times$  2.2. Uruk–probable Jemdet Nasr–Early Dynastic I. Surface material is mainly Cassite–Achaemenian.
- 1435 — 280 NW  $\times$  170  $\times$  3.5. A second, 250 m ESE, is 240 NE  $\times$  140 (at SW end, tapering to narrow ribbon of settlement at NE end)  $\times$  0.3. The main mound is Sasanian–Early Islamic, limited Samarran. The lower mound is Sasanian only.
- 1436 — NW arm of site 650  $\times$  220, E arm similar in length and width. Maximum ht. 3 m near their junction at an obtuse angle. Sasanian–Early Islamic.
- 1437 — 280 ENE  $\times$  220  $\times$  2.8, reaching this elevation only at the ENE end. An ancient canal from WSW passes directly through the site S of summit, apparently having been cut long after the abandonment. There has been shallow, recent pitting for graves. Probably a small Uruk settlement. Probable Jemdet Nasr and Early Dynastic I constitute the major occupation. The small amount of Achaemenian–Parthian–Sasanian material may come only from graves.
- 1438 — 110 NNW  $\times$  30  $\times$  0.6. Neo-Babylonian–Achaemenian–Parthian.
- 1439 Tūlūl Abū Fatas. 900 NE  $\times$  700  $\times$  6. Neo-Babylonian–Achaemenian–Parthian. The massiveness of the site suggests a longer period of occupation, but only sherds typical of these periods were noted.
- 1440 — Possibly 220 N  $\times$  100  $\times$  0.5, although dunes and low, wind-laid deposits obscure most of it. Uruk, probable Jemdet Nasr, and Early Dynastic I. Main periods of occupation Old Babylonian–Cassite.
- 1441 Tell Mugnas. 320 NNW  $\times$  180  $\times$  3. Sasanian, possibly also Early Islamic.
- 1442 Tell Abū Qubūr. 250 diam.  $\times$  2, with a ruined tower rising an additional 4 m. Trace of Uruk. Ur III–Larsa–Old Babylonian–Cassite. Recent.
- 1443 Tell Barghasha. 160 N  $\times$  120  $\times$  2.8. Possible small Uruk settlement. Seleucid–Parthian, limited Sasanian.
- 1444 Tell Swayfi (recorded on British  $\frac{1}{4}$ " map and in Inspectorate of Surveys records as Tell Suwaili). 150 NNW  $\times$  90  $\times$  1.2, surmounted by the ruins of a small qal'a without corner towers. Sasanian–possible Early Islamic, Recent.
- 1445 — 250 NNW  $\times$  160  $\times$  1.2. Traces of a small ancient canal from the NW adjoin the NE side of mound, and 30 m away in the same direction is the outer curve of a possible meander of a much larger ancient watercourse from the same direction. Trace of Uruk. Larsa–Old Babylonian.
- 1446 — 200 diam.  $\times$  2. Ur III–Larsa, Seleucid–Parthian.
- 1447 — 160 NNW  $\times$  90  $\times$  2. Achaemenian–Parthian.
- 1448 — 130 E  $\times$  70  $\times$  1. Intensive collection #1 made in circle of 5 m radius in center of site. Collection #2 was a supplementary, general collection made rapidly from entire mound under conditions of failing light. Middle/Late Uruk–Jemdet Nasr.
- 1449 — 250 NW  $\times$  180  $\times$  3. Mainly Ur III–Larsa–Old Babylonian, with a reduced Neo-Babylonian–Achaemenian occupation.
- 1450 — Perhaps 250 NE  $\times$  200  $\times$  2.8, but surrounded and partly covered by dunes. Probable Jemdet Nasr. Early Dynastic I/II/III–Akkadian–Ur III–Larsa–Old Babylonian–Cassite.
- 1451 — 160 N  $\times$  90  $\times$  0.4. Early Uruk, possible Jemdet Nasr. Early Dynastic I. Limited Seleucid–Parthian–Sasanian, these late periods perhaps representing no more than the use of the site as a cemetery for nearby site 1452.
- 1452 Tell Mrowā'. 240 NNW  $\times$  150  $\times$  5, with a serrated profile indicating a completely eroded qal'a on its summit. Ur III–Larsa, Seleucid–Parthian, Recent.
- 1453 — 120 E  $\times$  70  $\times$  0.2. Sasanian, possibly also Early Islamic.
- 1454 — 160 E  $\times$  100  $\times$  1, with an old watercourse from the NW immediately adjacent E and then a second mound, 160 NNW  $\times$  40  $\times$  0.2. The first mound may be the remains of a single building or building complex, for the pottery is found only in ridges suggestive of its inclusion in mud-brick walls, while the relatively more sterile courtyards and rooms have recently been wind-deflated. In addition, baked planoconvex brick walls (or wall footings) may outline a courtyard 45  $\times$  24 m, oriented at 055°. The low E mound again consists of hummocks protected by a surface cap of sherds while the more sterile areas apparently have been wind-deflated, and at its NNW end

- there is much ancient pottery kiln debris. Probable Jemdet Nasr. Early Dynastic I. Considerably less late Early Dynastic–Akkadian. There is also much Recent pottery on the W mound; perhaps the observed indications of architecture are only of that date.
- 1455 — 90 N  $\times$  40  $\times$  0.4. Possible Neo-Babylonian, mainly Achaemenian–Parthian.
- 1456 — 140 NW  $\times$  80  $\times$  1.8. Probably Jemdet Nasr. Early Dynastic I. Surface debris is mainly Neo-Babylonian–Achaemenian–Parthian.
- 1457 — 180 NW  $\times$  130  $\times$  0.4, although NW half of site is only at plain level. Larsa–Old Babylonian, Recent.
- 1458 — Perhaps 220 diam.  $\times$  1–1.5, but size obscured by enveloping dunes. Early Dynastic II/III–Akkadian. Primarily Ur III–Larsa. Limited Old Babylonian.
- 1459 This site is probably the one identified on the British  $\frac{1}{4}$ " map as Marauwah, but several local informants agreed that that name applied only to site 1452. No name could be elicited for this one, but Andrae calls it Dibbin. Size is very difficult to estimate, since the mound is completely beset by large dunes. An estimate of 350–400 m diam. is supported by surface evidence and by the area of slight discoloration on air photographs. Probably at least 6–8 m in ht., but there was no adjacent "plain level" from which to measure. Probable Jemdet Nasr. Early Dynastic I. Later Early Dynastic not identified. Surface debris primarily Akkadian–Ur III–Larsa. One edge-stamped brick bore a standard inscription of Amarsuena of the type widely encountered in the Warka survey (cf. Adams and Nissen 1972, p. 217).
- 1460 — 20 diam.  $\times$  1. Curving meander patterns of riverbed here seemingly pass under this small mound and hence are antecedent to it. A second mound of similar size occurs 40 m ENE, near the margins of the bed (which, of course, is a sequence of beds). Immediately SSE of the latter is an area of sparse debris extending partly over the bed, 140 diam., plain level. Early Uruk, probable Jemdet Nasr, and Early Dynastic I are modestly represented at and near the second mound. The first mound and the area of plain-level debris, both of which seem to postdate the existence of a full-scale watercourse here, are mainly Old Babylonian–Cassite.
- 1461 — Site is apparently more than 400 diam., although a very large dune covers much of its NE portion. The most prominent elevation (unless under the dune) is 2.2 m, immediately adjacent to the old watercourse along its SW margin. Most extensive occupation apparently during Old Babylonian–Cassite, continuing, particularly in the W half of site, into Middle/Neo-Babylonian–Achaemenian–Parthian.
- 1462 — 180 diam.  $\times$  2.2. Akkadian–Ur III–Larsa.
- 1463 — 220 NW  $\times$  120, hummocks to 0.6 m, but mostly plain level. Site may extend farther to W than these dimensions indicate, since dune cover in that direction is practically continuous. Limited Old Babylonian–Cassite. Mainly Neo-Babylonian–Achaemenian–Seleucid–Parthian.
- 1464 (Identical with WS-001.) Tell Baydha. This site was recorded as "entirely surrounded and partly covered by high dunes" at the time of our visit in 1967 (Adams and Nissen 1972, p. 219). In 1975 the immediate surroundings were dune-free, so that repetition of the visit did not become apparent until after bearings were plotted. Probably because of this removal of covering deposits, I would now increase our original estimate of size from 250 diam.  $\times$  6 to 350 diam.  $\times$  7. The original dating appraisal was Ur III–Larsa–Old Babylonian–Cassite. In addition, recent looters have brought to the surface many bricks with Seleucid stamps, possibly reflecting the use of the mound at that time only for tombs.
- 1465 — 240 WNW, along right bank of ancient canal levee,  $\times$  120  $\times$  0.8, with a 200  $\times$  80 extension SSW along branch canal. There are also small settlements on opposite, left bank and farther downstream on right bank. Probably a small Uruk settlement. Sasanian–possible Early Islamic.
- 1466 — 80 diam.  $\times$  0.3. Possible Achaemenian, mainly Seleucid–Parthian.
- 1467 — Perhaps 180 diam., but debris at plain level is sparse so that limits are vaguely defined. Only a small area of old kilns rises to 0.6 m. Neo-Babylonian–Achaemenian.
- 1468 — Dunes cover most of the lower portions of this site, which apparently extends more than 500 m along both banks of an ancient canal from WNW. Several individual summits rise to 3 m or more, and average width must be at least 150 m. Fairly numerous 21 cm sq. bricks. Sasanian–Early Islamic, possibly somewhat later.
- 1469 — Perhaps 240 diam., plain level, hummocks of 0.2 or less. A W extension of site may be covered by dune belt in that direction. Neo-Babylonian–Achaemenian–Seleucid–Parthian.
- 1470 — 250 NNE  $\times$  170  $\times$  0.8. Sasanian, possibly also Early Islamic.
- 1471 — 250 NW  $\times$  150  $\times$  1.8. Probable small, underlying Uruk and Jemdet Nasr settlements. Mainly Neo-Babylonian–Achaemenian–Parthian.
- 1472 — Perhaps originally 220 NNW  $\times$  110  $\times$  2, but dimensions may have been reduced by recent



- excavation of a deep drainage trench alongside. Sasanian—possibly also Early Islamic.
- 1473 Imām Idrīs. From Inspectorate of Surveys records: two sites are recorded, presumably adjoining. Tell Nabi Idrīs, file 63, register 2126; and Qubat (dome) Nabi Idrīs, file 64, register 2126. The tell is recorded as Neo-Babylonian, the shrine (presumably on a second mound) as Cassite–Neo-Babylonian.
- 1474 Sūq Lemlum. This site was not visited but is located as shown in Inspectorate of Surveys records. Chesney (1868, p. 285) distinguishes between “old” and “new” Lemlum, and it is the latter that is now designated Sūq Lemlum. It was flourishing at the time of his visit in the 1830s, being described as “a town containing a numerous population dwelling in prettily constructed reed huts—which are portable, and which had almost all been removed from their usual sites, on account of the floods, when I first visited this place.” On the other hand, a number of travelers’ itineraries make it clear that it was entirely in ruins by the end of the century.
- 1475 Tūlūl Qal’a ‘Alaywi. From Inspectorate of Surveys records, file 322, register 2622. Recorded as Islamic.
- 1476 Tūlūl (or Tlayl) Brayj. From Inspectorate of Surveys records, file 224, register 2622. Recorded as Isin-Larsa, Cassite.
- 1477 Qal’a Mohammed. From Inspectorate of Surveys records, file 323, register 2622. Recorded as Neo-Babylonian.
- 1478 Tūlūl Rwayha. From Inspectorate of Surveys records, file 321, register 2622. Recorded as Islamic.
- 1479 Umm al-Dūd. From Inspectorate of Surveys records, file 303, register 2622. Recorded as Sasanian.
- 1480 Tell Hib. From Inspectorate of Surveys records, file 313, register 2622. Recorded as Sasanian.
- 1481 Tell Nabi Ibrahim. From Inspectorate of Surveys records: two sites, presumably adjacent, are recorded. Sharqi, file 311, register 2622; and Gharbi, file 312, register 2622. Both are recorded as Islamic.
- 1482 Ishān Mas’udiyah. From Inspectorate of Surveys records, file 325, register 2622. No provisional dating recorded.
- 1483 Tell Hadadiyah. From Inspectorate of Surveys records, file 315, register 2622. Recorded as Islamic.
- 1484 ——— Probably 90 diam.  $\times$  2.5 originally, although partly stripped away during recent road construction. Parthian.
- 1485 ——— 180 NE  $\times$  70  $\times$  2, but occupational debris merges with canal banks to the NW and hence may cover a substantially larger area. Sasanian.
- 1486 Arth al-Nowayer. An isolated building 85 m square. It lies immediately E of the Shatt al-Najmi, a former Euphrates branch, and adjoins a track that crosses the now-dry bed. The exposed lower walls and wall footings are of reused baked brick; the upper walls may have been of mud brick, for they have entirely eroded away. There are no corner towers. Sparse debris. Recent. Possibly a khan or police post adjoining a formerly important Euphrates crossing. Reference to well sweeps in site name may suggest a terminal phase of use of the channel after the water level had fallen too low to provide gravity flow into the existing network of canal offtakes.
- 1487 ——— 450 WNW  $\times$  180  $\times$  3, although rising to this ht. only in five small, distinguishable summits near WNW end. Sasanian, possible Early Islamic.
- 1488 300 diam.  $\times$  2.4. Parthian.
- 1489 Tell Hsayn. 110 N  $\times$  40  $\times$  3.5. Parthian.
- 1490 ——— 70 diam.  $\times$  2.5, with a low outlier immediately NNE. Seleucid-Parthian.
- 1491 Tell Hujayl. 140 diam.  $\times$  2.5. Parthian.
- 1492 ——— 90 NE  $\times$  40  $\times$  1.2. Sparse surface pottery. Sasanian.
- 1493 Tell Shahal. 80 diam.  $\times$  5.5, its uppermost levels recently and inexplicably bulldozed away. Immediately N is a second mound, 60 diam.  $\times$  2.5, and there is third, still smaller one 20 m S. Pottery is rare, especially on the main mound, and it may have been an artificial construction rather than a gradual accumulation of occupational debris. Sasanian.
- 1494 ——— 80 diam.  $\times$  0.7, with an approximately equal area of debris at plain level extending E. Sasanian, probably also Early Islamic.
- 1495 ——— 600 WNW  $\times$  300  $\times$  2.5. Sasanian.
- 1496 ——— 120 NW  $\times$  50  $\times$  1. Much brick-kiln debris. Sasanian, Recent.
- 1497 ——— 80 diam.  $\times$  0.6. Sasanian.
- 1498 ——— Two adjoining 60 diam.  $\times$  2 mounds along a NE axis, with a third, smaller one farther NE. Possible Neo-Babylonian–Achaemenian. Mainly Seleucid-Parthian.
- 1499 ——— 220 NNE  $\times$  150, rising at the N end to 4 m. 150 m W are the isolated remains of an ancient brick kiln. 100 m SE is a second mound, 200 diam.  $\times$  2. Seleucid-Parthian.
- 1500 ——— 600 ENE  $\times$  100–160, rising to 2.5 m ht. at ENE end only. Site consists of occupational debris mixed with canal spoil banks. Immediately SE of NE end, probably across an ancient canal, is a second 120 diam.  $\times$  2. Parthian.
- 1501 Tell Hnayta. 220 diam.  $\times$  2.5. Very extensively, almost continuously covered with shallow pits apparently directed at shallow graves. Mainly Early Dynastic II/III, continuing on a smaller scale

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- into Akkadian–Larsa times. The graves that seem to have been the focus of the looters' attention are Sasanian.
- 1502 — 120 diam.  $\times$  2.8. Larsa–Old Babylonian, Sasanian.
- 1503 — 100 diam.  $\times$  4, not including a 2 m conical pile of earth erected as a survey benchmark. On the summit are the remains of a qal'a 25 m square, the walls almost entirely eroded away. Ur III–Larsa, Achaemenian–Parthian, Recent.
- 1504 — 200 diam.  $\times$  2, with a 2.5 truncated cone of large, probably reused baked bricks suggesting a fairly recent shrine. NE across an old canal levee is a second mound, 280 NW  $\times$  100  $\times$  2.6. Sasanian–Early Islamic.
- 1505 — 450 NW  $\times$  130  $\times$  2.5. Late Islamic, Recent.
- 1506 — 450 NNW  $\times$  100  $\times$  2.2. Late Islamic, Recent.
- 1507 — Two very small but considerably elevated (2.5 m) mounds, one about 250 m ESE of the other. 300 m farther SSE is a third, 120 NW  $\times$  80  $\times$  1.8. The first two are Sasanian–Early Islamic, Late Islamic. The third is Late Islamic only.
- 1508 — 70 diam.  $\times$  2. Larsa–Old Babylonian. Primarily Cassite. Limited Sasanian, perhaps only reflecting use of the mound at that time as a cemetery.
- 1509 — 420 NW  $\times$  220  $\times$  2.4. Trace of Ur III–Larsa. Achaemenian–Parthian, possibly also Sasanian.
- 1510 — 120 diam.  $\times$  1. Traces of Larsa–Old Babylonian–Cassite debris, possibly not representing primary settlements. Mainly Sasanian.
- 1511 — 130 diam.  $\times$  0.8. Seleucid–Parthian.
- 1512 — 100 diam.  $\times$  0.9. Seleucid–Parthian.
- 1513 Tell Ibris. 130 E  $\times$  50  $\times$  5, although these dimensions are somewhat conjectural owing to the destruction accompanying recent canal-digging around the mound. Old Babylonian–Cassite, Recent.
- 1514 — 110 ENE  $\times$  30  $\times$  1.2. 30 m SE is a second mound, 60 diam.  $\times$  1. Sasanian, Recent.
- 1515 Tell al-Zelaga. 150 diam.  $\times$  4. 300 m SSW is a second, 120 diam.  $\times$  1.5. Trace of Cassite, mainly Parthian, Recent at the main mound. Recent only at the smaller mound.
- 1516 — 160 diam.  $\times$  5, with a small, low mound adjoining ENE. Seleucid–Parthian.
- 1517 — 160 diam.  $\times$  3. Seleucid–Parthian.
- 1518 Ishān al-Turrma. A low mound at least 250 diam., with an arm of debris extending SW around or across a broad bay or channel. The most prominent part of the site is a conical summit 30 diam.  $\times$  9 that served as a survey benchmark. Sasanian.
- 1519 — 200 E  $\times$  160  $\times$  3. Sasanian.
- 1520 — 180 E  $\times$  120  $\times$  4, reaching this ht. only near W end. Sasanian.
- 1521 Imām Abū al-Fadil. The shrine, built of reused brick, is about 6  $\times$  6 m. It is in ruins, most of the dome having fallen in, but the rubble has been cleared from the interior, and green and white flags on the grave there suggest that it is still periodically in use. The underlying mound is 80 NW  $\times$  60  $\times$  3, with modern graves to the NW of the shrine. 180 m NW is a second mound, 180 N  $\times$  120  $\times$  3. 100 m NE, across a depression suggestive of an old watercourse, is a third mound, 110 diam.  $\times$  1.5. Sasanian, possible Early Islamic. Recent pottery is plentiful only around the shrine.
- 1522 — 90 diam.  $\times$  1.4. Parthian.
- 1523 — 200 diam.  $\times$  2.5, with an ancient E–W canal passing through the N part of the site. Parthian–Sasanian.
- 1524 — 140 NW  $\times$  100  $\times$  2.5. Sasanian.
- 1525 Tūlūl Tabbīrat. 180 diam.  $\times$  4, with broad, ancient watercourse beds flowing around both sides of the site from the N and NW and meeting 100 m SE. Sasanian, possible Early Islamic, Recent.
- 1526 — A ruined qal'a, its NE tower still standing to a ht. of 5 m, lies at the W end of a mound 130 E  $\times$  80  $\times$  1.2. Farther E, possibly across the bed of a former watercourse, is a mound 220 NNW  $\times$  120  $\times$  3.5. Possible Old Babylonian. Mainly Cassite. Some Recent pottery also.
- 1527 Tūlūl Tabbīrat. 190 NW  $\times$  120  $\times$  5. Possible Parthian. Sasanian.
- 1528 — 150 WNW  $\times$  100  $\times$  2.5. Old Babylonian, Recent.
- 1529 Tūlūl Jezzāz. This may be alternatively interpreted, either as a half-dozen or more separate mounds strung out for 2 km along an E–W canal levee (as shown on base map) or as a more or less continuous strip settlement for this distance. Surface pottery declines in density at plain-level intervals between mounds but is present throughout. Sasanian.
- 1530 — Main mound 140 E  $\times$  110  $\times$  2, but three other, only slightly smaller mounds occur ESE, SE, and S, giving the group a NW axis of about 900 m. Sasanian.
- 1531 — 70 NNW  $\times$  40  $\times$  0.4. Recent.
- 1532 Tūlūl Jezzāz. 240 NW  $\times$  140  $\times$  4, seemingly composed in very large part of slag from glass furnaces. There are great numbers of irregular chunks of glass adhering to clay furnace lining, colorless or in green, brown, blue, and violet hues. 400 m ESE is a second mound, 180 diam.  $\times$  2.5. Much glass slag occurs here also, but with a greater proportion of chunks of glass without

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- furance-lining adhesions, as well as with greater numbers of glass vessels of various kinds and with more occupational debris. Sasanian–Early Islamic. It seems possible that we have here the remains of a specialized glass-producing unit and a nearby settlement where glass artifacts were manufactured.
- 1553 Tūlūl Jezzāz. 280 diam.  $\times$  3, immediately E of site 1532 and with almost as much evidence of glass production. Sasanian–Early Islamic.
- 1534 Tūlūl Jezzāz. Extends irregularly for about 1.5 km ENE along an ancient canal levee. Average width appears to be about 230 m. Some elevation of debris is continuous, and many individual mounds rise to 2 or 3 m. Toward the ENE end is the most prominent mound in the group, 50 diam.  $\times$  4, with the well-preserved bases of three glass kilns forming its summit. Kiln debris and other evidence of extensive glassmaking is very plentiful on all parts of the site. Sasanian, probably also Early Islamic.
- 1535 — Four adjoining mounds along an ENE line, all less than 100 diam.  $\times$  1. Sasanian.
- 1536 — 140 E  $\times$  90  $\times$  1.8. Sasanian–probable Early Islamic.
- 1537 — Only a ruined tower 5 m in diam. survives of a former qal'a. There is a small surrounding settlement. Recent.
- 1538 — Qal'a 17 m square, with towers at N and S corners, the latter still standing to a ht. of 6 m. To the NW is a mound 60 diam.  $\times$  0.6. Recent.
- 1539 — 80 diam.  $\times$  0.6. Sparse debris includes an ancient brick kiln rising to 1.4 m. Sparse debris also occurs at intervals along an ancient ESE canal levee passing just S of site, and there is another apparent kiln 200 m S. Sasanian.
- 1540 — 240 NW  $\times$  140  $\times$  0.1, low, irregular clusters and hummocks of fairly dense pottery and debris. Cassite–Middle Babylonian.
- 1541 — 160 diam., mostly low but with the SW portion reaching a ht. of 1 m and one ENE hummock rising 2 m. Much brick-kiln debris. Sasanian, also a little Recent pottery.
- 1542 — 100 diam.  $\times$  3 in the NE, elsewhere 2 m or less. Brick-kiln debris. Parthian, possibly also Sasanian.
- 1543 — 200 diam.  $\times$  2.5. Sasanian.
- 1544 — 160 diam.  $\times$  0.8, bisected by an old canal levee from NW. Sasanian.
- 1545 — 140 NE  $\times$  80  $\times$  0.2. Sasanian.
- 1546 Ishin al-Soda. From Inspectorate of Surveys records, file 317, register 2622. Recorded as Islamic.
- 1547 Ishān Tammah. From Inspectorate of Surveys records, file 316, register 2622. Recorded as Parthian–Sasanian.
- 1548 — 220 diam.  $\times$  0.5. Sasanian.
- 1549 Tūlūl al-Ajjāz. The E portion of this prominent landmark and settlement is somewhat irregular but may be described as 300 diam., with steeply sloping sides and with hillocks on its elevated central portion rising to 6 m. To the W is a relatively lower area, apparently crossed by canals from the N, then a W mound 600 N  $\times$  120 that again rises in hillocks to 6 m. Minor outlying settlements occur along an old canal levee leading SSE, at distances of 300 and 1,100 m. Surface traces of major construction can be seen in many places on the E mound. The most massive, on its W end, appears to be a single monumental building covering an area of at least 110  $\times$  42, with walls up to 3 m thick. Parthian–Sasanian.
- 1550 — 140 NE  $\times$  100  $\times$  1.5. Salt encrustations suggest mud-brick walls of a major ancient building or buildings, covering much of the surface of the mound. Parthian.
- 1551 — 90 diam.  $\times$  0.5. Seleucid–Parthian.
- 1552 — 240 NW  $\times$  180  $\times$  1.2. Seleucid–Parthian.
- 1553 — A high, solitary, ruined tower on a mound 90 E  $\times$  20  $\times$  0.7. Seleucid–Parthian, Recent.
- 1554 — Ruined qal'a 16 m square, its largest (NW) corner tower 5 m in diam. and still standing to a ht. of 5 m. The underlying mound is 120 NE  $\times$  80  $\times$  1. Neo-Babylonian and/or Achaemenian probable. Mainly Seleucid–Parthian, Recent.
- 1555 — 300 diam.  $\times$  2.4, sloping gently up to a maximum ht. at the N end. Site boundaries are well defined, with suggestion of a continuous contour break possibly arguing for an outer wall. Extensive if largely superficial plundering of shallow graves—or graves made shallow by wind erosion of the mound summit. Ur III–Larsa. The graves on which the looting has been focused are Sasanian–Early Islamic, but there is no suggestion of a contemporary settlement here to accompany them.
- 1556 — The most easily defined part of this site is a low mound at its E end 160 N  $\times$  120  $\times$  0.6, but a ribbon of debris at plain level also extends WNW for at least 800 m. Sasanian, possible Early Islamic.
- 1557 — 190 diam.  $\times$  3. Sasanian.
- 1558 — 140 diam.  $\times$  1. Seleucid–Parthian.
- 1559 — 240 NW  $\times$  100  $\times$  2, bisected by an ancient canal bed from NW. Many glass kiln wasters. Sasanian–Early Islamic.
- 1560 — 500 NE  $\times$  150–250  $\times$  1.5. Possible Parthian. Mainly Sasanian.
- 1561 — 80 diam.  $\times$  0.5. Sasanian, Recent.
- 1562 — 120 NW  $\times$  60  $\times$  0.3. Recent.
- 1563 — 100 diam.  $\times$  1. Ur III–Larsa, Parthian.

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- 1564 — 120 NE  $\times$  50  $\times$  0.3. Recent.
- 1565 — 250 diam., no perceptible elevation, yet with fairly dense and continuous surface pottery. Sasanian.
- 1566 — 170 WNW  $\times$  60  $\times$  0.6. 200 m WNW is a second, smaller mound. Sasanian, Recent.
- 1567 — 60 diam.  $\times$  0.4. Parthian-Sasanian.
- 1568 — 120 diam.  $\times$  2, flattopped and steep-sided, with the apparent remains of a defensive wall around the top of the site. 140 m WNW are the ruins of a large qal'a. Sasanian, probably also Early Islamic. The wall on the summit of the mound and the qal'a are Recent.
- 1569 — At least 200 diam.  $\times$  0.3, although dunes may obscure further extensions W and N. 500 m ESE is a second, 300 diam.  $\times$  0.8 but somewhat irregular in outline. Other low, irregular areas of debris are 200 m NW and NE of the second. The first mound is Parthian-Sasanian. The remaining mounds are Sasanian with small, scattered Recent settlements as well.
- 1570 — 100 diam.  $\times$  1. 60 m S is a second, 160 diam.  $\times$  0.8. Mainly Cassite-Middle Babylonian. There is a thin and limited Sasanian overlay.
- 1571 — 230 diam.  $\times$  3.8. Trace of Uruk. Cassite-Parthian. Small Recent occupation.
- 1572 — 160 diam.  $\times$  4.2, this ht. including a small conical mound recently constructed as a survey benchmark. Immediately W is the deep outlet channel of a substantial lake, and SW across this channel is a second mound, 140 NNW  $\times$  60  $\times$  0.8. The shoreline of the lake at this point is about 2 m above present bed level, although it has been irregularly cut away by severe wind erosion. The difference in elevation declines progressively as one follows the shoreline NE and declines more slowly as one follows it W. The lake bed is very flat and almost featureless, although low hummocks of sand have formed around shrubs and small bushes. It is almost continuously covered with shells in areas where these aeolian deposits are not present. The mounds adjoining the outlet are mainly Seleucid-Parthian, with small Sasanian and Recent occupations also. Probably the lake has a longer and more complex history than this suggests, for it will be observed that archaeological sites are seemingly entirely absent in an area of nearly 100 sq. km N, NW, and W of these mounds. On the other hand, relatively faint traces of ancient canal levees can be followed through much of this unsettled area. That seems to argue that the lake was a long-lived but not continuously maintained geological feature, its bed periodically dry enough to afford irrigable tracts for agriculture while generally too subject to flooding to attract settlement. The outlet channel also may have a complex history. Its present course has the irregularity of a natural stream bed and yet follows a general course suggestive of a former canal. Perhaps it was an artificially maintained outlet at the time of the major occupation of these mounds but has been uncontrolled since Parthian or Sasanian times and hence modified in channel characteristics by periodic natural overflows.
- 1573 — 200 NE  $\times$  40  $\times$  0.2. Mainly Sasanian; a little Recent pottery.
- 1574 — 20 diam.  $\times$  0.4. Cassite-Middle Babylonian.
- 1575 — 270 WNW  $\times$  180  $\times$  0.6, with a lower extension or immediately adjoining mound SW that is 160 diam. Cassite-Middle Babylonian. Small Recent occupation.
- 1576 — 30 diam.  $\times$  0.4. Seleucid-Parthian.
- 1577 — 60 diam.  $\times$  2.6, with a well-defined channel below plain level curving around the N and E margins of the mound. On its summit is a qal'a 20 NW  $\times$  17, with a single corner tower on the S. Parthian-Sasanian, Recent.
- 1578 — 80 diam.  $\times$  1.2. Sasanian.
- 1579 — 230 N  $\times$  180  $\times$  2.2. Ur III-Larsa.
- 1580 — 120 WNW  $\times$  30, low hummocks of debris that include graves being exposed by wind erosion. A canal levee passing through this site can be traced ESE to where it overlies a much earlier, meandering watercourse discussed in connection with site 1590. Sasanian.
- 1581 — 160 diam.  $\times$  0.2, the S half at plain level except for scattered hummocks. Sasanian, Recent.
- 1582 — 220 diam.  $\times$  0.3. Numerous small outcroppings of contemporary debris occur at intervals to ESE along old canal levee. Sasanian.
- 1583 — 130 E  $\times$  90  $\times$  0.5. Old Babylonian-Cassite-Middle Babylonian. Small Sasanian, Recent occupations.
- 1584 — Low hummocks of sparse debris within an area 80 diam. Adjoins the S bank of an old canal levee from the WNW, with which it must be contemporary. Cassite-Middle Babylonian.
- 1585 — 180 E  $\times$  70  $\times$  0.5, with a shallow depression suggesting that the site was bisected by an old canal from the NNE. Possible Achaemenian, mainly Seleucid-Parthian. Trace of Early Islamic, some Recent.
- 1586 — 70 diam.  $\times$  0.6. Sasanian, Recent.
- 1587 — 120 NW  $\times$  70  $\times$  2. Relatively recent, meandering watercourse channels flow around most of the site and meet S of it. Seleucid-Parthian, Recent.
- 1588 — 200 NW  $\times$  110  $\times$  2. Shallow looting of

- graves has resulted in a hummocky surface appearance. Parthian–Sasanian, Recent.
- 1589 — 20 diam., low hummocks similarly situated to site 1584. Cassite–Middle Babylonian.
- 1590 — A very small cluster of debris on the S bank of an old levee, similar to site 1589. It has a compact, well-defined, white-crusted bed 8 m wide, while the associated disturbance zone (presumably spoil banks) is 17 m in total width. This bed is perpendicular to, and clearly overlies, a much wider, meandering bed. The latter, consisting of integrading ridges and channels that can be traced in wind-erosion patterns, bands marked by slight differences in the density of minute fragments of shell, and linear arrangements of low shrubs, has a width of 75 m. The underlying watercourse, presumably following an essentially “natural” regime, could be followed only a short distance upstream from this point because of overlying wind-laid deposits accumulating around low shrubs. Downstream, however, its meandering course could be followed to the NW foot of site 1591, with bifurcating channels below there apparently continuing to sites 1600, 1601, and 1628. On its right bank was a rather clear and uniformly compacted, whitish band about 6 m wide that may have been a minor canal paralleling the general direction of the meandering watercourse, but this was soon lost beneath later wind-laid deposits. On the right bank of this 6 m canal, 120 m SW of the superimposed canal crossing, is a small pile of  $30 \times 16 \times 6$  cm baked brick with sparse associated pottery. The overlying canal from the WNW, following a straight and presumably “artificial” course, could be continuously traced past sites 1584, 1589, 1590, 1592, and to within 300 m of site 1593, and more intermittently followed upstream beyond site 1584 to site 1570. The small cluster of debris here is Ur III–Larsa, and the same dating applies to all the settlements served by the underlying, meandering watercourse. The overlying, straight canal from the WNW, on the other hand, serves a string of small sites that are all of Cassite–Middle Babylonian date.
- 1591 — Boundaries poorly defined, but at least  $300 \text{ WNW} \times 150 \times 2$ . Bricks  $24 \times 17 \times 8$ . Mainly Ur III–Larsa, probably continuing on a small scale into the Old Babylonian period.
- 1592 — A ribbon of settlement on the right bank of the same levee from the WNW as that identified in sites 1584, 1589, and 1590.  $120 \text{ WNW}$ , very low and narrow. Trace of Uruk. Cassite–Middle Babylonian.
- 1593 — A roughly square qal’a, oriented N and measuring 27 m on a side. A well-defined meandering channel below plain level curves around the E side of the fort, but to the W and N the low mound underlying it extends for 40 m. Some Sasanian. The major occupation seems to have been Recent.
- 1594 —  $50 \text{ NNW} \times 20 \times 1$ . There is a second, very small mound immediately NNW. Cassite–Middle Babylonian. Minor Sasanian, Recent occupations.
- 1595 — Indistinct mounds, including much brick-kiln refuse, run NW along both sides of an ancient canal levee for about 500 m. The strip of debris is 180 wide at NW end, declining to 100 at SE. Parthian–Sasanian.
- 1596 — Two adjoining mounds on a NE–SW axis, each about 120 diam.  $\times 2.2$ . Both are largely composed of brick-kiln slag and cinders. Parthian–Sasanian.
- 1597 Imām Mizhir. The name applies to a small shrine of reed mats on one of the smaller, lower NNE summits of the site. The site itself is 350 diam., rising to 4.5 m in four large and many smaller summits. Additional debris occurs at plain level for at least 250 m SE. Mainly Parthian, with an apparently thin Sasanian overlay. But the plain-level debris appears to be Sasanian, not Parthian.
- 1598 — 70 diam.  $\times 0.6$ .  $120 \text{ m WNW}$ , across a broad, old canal levee, is a second, 40 diam.  $\times 0.3$ . Seleucid–Parthian, some Recent.
- 1599 —  $90 \text{ E} \times 50 \times 1$ . Mainly Cassite–Middle Babylonian. Small Sasanian, Recent occupations.
- 1600 — A slightly curving ribbon of debris, 110 m in length and in most places 10 m or less in width, on the outer, W bank of a meander loop of the former watercourse identified in site 1590. Ur III–Larsa.
- 1601 — 15 diam.  $\times 0.2$ , situated at the apex of a meander loop as in site 1600. Ur III–Larsa.
- 1602 — 120 diam.  $\times 0.1$ . Trace of Uruk. Cassite–Middle–Neo–Babylonian. Trace of Parthian.
- 1603 —  $180 \text{ NNW} \times 120 \times 2$ . Cassite–Middle Babylonian. Small Sasanian, Recent occupations on E.
- 1604 — A scatter of sherds at plain level within an area perhaps 100 diam., save that density only diminishes gradually toward the periphery so that the limits of the site are somewhat arbitrary. Pre-Ubaid and/or Ubaid I. See separately published account (Adams 1975a).
- 1605 — Two adjoining clusters of debris at plain level, that to the N 40 diam., that to the S 20 diam. Cassite–Middle Babylonian.
- 1606 Alwat Kred. Perhaps 300 or 350 diam.  $\times 1.1$ , but surrounding canal spoil banks and limited surface pottery owing to high salinity make size estimate difficult. Low, salt-encrusted swellings that may have been outlying settlements occur at

- intervals to the NE and SW. Probably in the Seleucid-Parthian-Sasanian range; the very limited collection makes greater specificity impossible.
- 1607 Tell Igdayr. 250 diam.  $\times$  1.8. Seleucid-Parthian.
- 1608 Ishān Abū al-Dinayn. 180 diam.  $\times$  4.5, with a small outlying mound 250 m ESE. Very saline; collection sparse. Seleucid-Parthian.
- 1609 Imām Nabi Sulayman. Large (39  $\times$  32) green-domed shrine of baked brick, surrounded by modern cemetery, standing on the N shoulder of a mound 240 NNW  $\times$  80  $\times$  2.4. Seleucid-Parthian.
- 1610 — 300 NE  $\times$  200, although with appreciable elevation (to 1 m) only in SW. Saline encrustations suggestively outline very substantial construction to the NE, with walls up to 2 m thick and an apparent courtyard 60 m square. There may be a single monumental building 140 NE  $\times$  110. Cassite-Middle Babylonian.
- 1611 — 110 diam.  $\times$  0.6. Sasanian.
- 1612 — 160 NE  $\times$  130  $\times$  0.6. Well-made 29  $\times$  29  $\times$  7 bricks. Trace of Uruk. Mostly Cassite-Middle Babylonian surface pottery, although the bricks suggest a continuation into Neo-Babylonian times. Sparse Sasanian pottery may all be from graves.
- 1613 — 140 NNE  $\times$  50  $\times$  2. Mainly Cassite-Middle Babylonian. Possible Parthian. Minor Sasanian occupation.
- 1614 — 220 N  $\times$  120  $\times$  1.2, although rising to 2.2 in a conical earth mound at the N end built as a survey benchmark. Sasanian.
- 1615 — 80 diam.  $\times$  0.8, the margins of the mound blending imperceptibly with the plain under conditions of high salinity. Owing to poor collecting conditions an intensive collection within a delimited area was impractical, and types were tabulated only on a presence-absence basis. One or more pottery kilns can be seen in place on the E side of the mound. Middle/Late Uruk. Jemdet Nasr and Early Dynastic I are limited to the E and SE portions of the mound.
- 1616 — 60 diam.  $\times$  0.8, with lower debris extending S and SW for 100 m. A depression that is probably a former watercourse bed curves around the N and E portions of the site. Parthian-Sasanian.
- 1617 — 110 NE  $\times$  40  $\times$  1, although this estimate may be inflated by adjacent canal levees. Saline; limited collection. Sasanian.
- 1618 — 120 diam.  $\times$  1.5. Very saline; poor collecting conditions. But pottery at plain level extends 20 m W and up to 180 m E and NE of the mound. Trace of Uruk. The plain-level debris is primarily Ur III-Larsa, while the mound is Sasanian.
- 1619 — 180 diam.  $\times$  0.7. Sasanian.
- 1620 — 280 WNW  $\times$  120  $\times$  2.4, either two distinct settlements or one bisected by an old canal bed. The higher end of the site, to the ESE, is mainly Parthian, some Sasanian. The WNW end may be only Sasanian.
- 1621 — 160 diam.  $\times$  0.8. Much slag and cinders, suggesting an ancient brick kiln. Sasanian.
- 1622 — 220 ENE  $\times$  160  $\times$  0.6, with a few small, slightly higher hummocks. Sasanian.
- 1623 — 180 diam.  $\times$  1.2, bisected by an old canal bed from WNW. Scattered, low clusters of debris also occur SSW. Sasanian.
- 1624 — 180 N  $\times$  100  $\times$  0.8. Some Parthian, mainly Sasanian.
- 1625 Tell al-Mūshaur. 200 NW  $\times$  130  $\times$  3. 120 m NNW is a second, 140 NW  $\times$  80  $\times$  1.8, tailing off farther NW through fields that have been abandoned fairly recently for lack of adequate water. Equidistant to the SW is a third small mound, so that the three form roughly an equilateral triangle. Saline, hence limited collection. Possible Neo-Babylonian. Mainly Seleucid-Parthian.
- 1626 — 150 diam.  $\times$  2, with a smaller, lower mound immediately E. Parthian.
- 1627 — A strip settlement along an old canal levee, extending about 800 m ESE. There are three principal nuclei of settlement, where the site expands in width to 100–150 m and rises to 1.5 m ht. Sasanian.
- 1628 — 210 diam.  $\times$  2. There has been old, extensive looting of shallow graves, the pits now largely obliterated by wind-laid overlay. Collecting conditions are poor due to the latter. Parthian slipper-coffin fragments and Sasanian storage jars are the main visible surface components, but the absence of other associated ceramic types argues that these reflect only the late cemetery rather than a settlement. Hence the early component is likely to be the primary one, difficult as it was to establish: Ur III-Larsa.
- 1629 — 250 diam.  $\times$  2, topped by a conical mound of apparently recent construction for cartographic survey. An irregular but continuous series of much smaller, lower mounds begins 150 m S and continues S for 600 m, apparently defining an old canal levee. Sasanian.
- 1630 — A sparse scatter of surface pottery within an area 25 m in diam. Both Ur III-Larsa and Cassite-Middle Babylonian occupations can be definitely identified in spite of the limited amount of surface material.
- 1631 — 800 NW, irregular widths up to 120 m. Two summits at SE end are 2.8 high, that at NW is 2.0 m. Achaemenian possible. Parthian-Sasanian.
- 1632 — An agglomeration of low, irregular hum-

mocks that can only be roughly described as 180 diam.  $\times$  0.8. Similar, but smaller and more scattered, hummocks occur at intervals for about 1 km S along old canal levee. Sasanian.

- 1633 — 160 diam.  $\times$  1. Trace of Uruk. Sasanian.  
 1634 — 90 NW  $\times$  50  $\times$  0.8. 300 m SSW is a second, 50 NW  $\times$  30  $\times$  0.7. Parthian.  
 1635 Imām Sayyid Shōka. A newly rebuilt but reportedly very old shrine, now of baked brick and with the traditional blue dome. 300 m SW are the remains of a village that must have been abandoned fairly recently, but an older settlement or one in the immediate vicinity of the shrine is not in evidence. The local topography is obscured, however, by dunes surmounting an old canal levee from the NE.  
 1636 Haush Umm al-Shah'ir. Two adjoining mud-brick qal'as; cf. plan and brief descriptive note in Finster and Schmidt (1976, pp. 167–68). The underlying site merges with ancient levees and hence is difficult to define, but a broad ribbon of debris extends 250 m W, and there are also substantial outcroppings to the N. Most of the site is less than 0.5 m in elevation, particularly to the E, but under the forts themselves there may be 1.5 m of cultural accumulation. Sasanian, Recent.  
 1637 — 40 diam.  $\times$  1. Some Parthian, probably mainly Sasanian.  
 1638 — 80 diam.  $\times$  0.8, with graves and scattered debris at plain level extending about 50 m NW and SE. Seleucid-Parthian. There are numerous baked bricks bearing triangular Seleucid stamp impressions.  
 1639 — 90 NE  $\times$  30  $\times$  0.3. Cassite–Middle Babylonian.

#### Other Relevant Sites in the Region

Listed below are sites initially cataloged as part of the Warka survey (Adams and Nissen 1972) that were visited for the purpose of making new, intensive sherd collections for dating. Also listed and briefly described are a few sites that were originally visited in connection with the much earlier Akkad survey (Adams 1972) and that were not revisited as a part of this study.

- 118 — Description as given in *The Uruk Countryside*, but dating assessment given therein supplemented by intensive collection within a circle of 5 m radius on the center of the main mound. Early Uruk.  
 125 — Description as given in *The Uruk Countryside*, but dating assessment given therein supplemented by intensive collections: #1, circle of 5 m radius about 100 m N of SE end of mound; #2

similar circle, NW central part of same mound; types observed only elsewhere on the mound are recorded in the same listing on a presence-absence basis. Probable Middle Uruk. Maximal extent of settlement in Late Uruk. Jemdet Nasr. Substantially reduced occupation in Early Dynastic I.

- 126 — Description as given in *The Uruk Countryside*, but dating assessment given therein supplemented by intensive collection within a circle of 5 m radius, NE central mound. Traces of a very limited occupation in the Ubaid II/III periods were localized in a small part of the NW quadrant of the mound. Primary occupation Late Uruk. Jemdet Nasr probable but uncertain. Early Dynastic I occupation extremely limited.

- 128 — Description as given in *The Uruk Countryside*, but dating assessment given therein supplemented by intensive collections within two circles of 5 m radius: #1, center N mound; 2, center S mound. Probably Middle Uruk. Maximum extent of settlement in Late Uruk. Jemdet Nasr occupation probable but uncertain, Early Dynastic I occupation extremely limited. See separately published discussion of a group of nearly identical, bifacially worked flint implements found here during restudy (Adams 1975b).

- 245 Tell Mismar. (See Schmidt 1978.) Physical description remains as given originally, but further details on dating are now available. Two intensive collections were made for this purpose on the N mound in the group, both within circles of 5 m radius. Collection #1 was made near the SE end, #2 on the N end near a substantial outcropping of clay cones with heads identified for pigment. Unsystematic observations on the S mounds in the group indicate a primarily or exclusively Jemdet Nasr occupation. Ubaid–Early/Middle/Late Uruk. Major occupation Jemdet Nasr, although the character of the cones identified the public building on the surface of the N mound as probably coeval with Eanna X in the Uruk excavations (J. Schmidt, pers. comm.), Early Uruk. Much reduced occupation in Early Dynastic I. Sasanian burials confined to NW part of N mound, where they have been disturbed by recent shallow pitting. A kiln on the SW end of the site probably is also Sasanian, although early kiln wasters on N mound argue for local ceramic production also in late prehistoric times. There are also a few Recent burials.

- A221 — The central mound in the group shown is kidney-shaped, roughly 250 NW  $\times$  100  $\times$  4. The deep main drainage canal of the Mussayib project has been cut through the E end of the site, providing an exposed section of occupational debris 5–6

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- m below plain level (Harris and Adams 1957). The central mound is Uruk, Akkadian-Larsa, Parthian-Sasanian. The surrounding mounds in the group are Parthian-Sasanian only.
- A259 — 120 NW  $\times$  50  $\times$  1. SE half includes a possible small Uruk settlement, mainly Larsa-Old Babylonian. NW half Middle Islamic.
- A261 — 150 NNW  $\times$  70  $\times$  3, bisected almost to plain level by an old canal cut that is now used as a roadbed. To the W is a very large, low settlement, 700 WNW  $\times$  150, and there are also small mounds to the S. Probably a small, underlying Uruk site at the first mound, although it is mainly Larsa-Old Babylonian-Cassite. The large, low settlement is Early/Middle-possibly Late Islamic, while the small mounds to the S are Sasanian.
- A264 — 220 NNW  $\times$  120  $\times$  2. 20 m SW is a second, 80 diam.  $\times$  1.5. The second, smaller mound is Early/Middle Uruk, Akkadian, Old Babylonian. The larger one may begin in the Old Babylonian period but is mainly Cassite, Sasanian.
- A265 — 100 diam.  $\times$  3. Neo-Babylonian-Achaemenian.
- A266 Tūlūl Abū Adham. An irregular mound group of about eight major summits within an area, 1,300 ENE  $\times$  500. Neo-Babylonian-Achaemenian-Parthian.
- A273 — 100 diam.  $\times$  2. Adjacent SE is a second, 75 diam  $\times$  1.5. Cassite.
- A274 — Multiple small summits form a dispersed group tending NNE for more than 1 km. Neo-Babylonian-Achaemenian-Parthian.
- A275 Tell Abu Salabikh. A carefully detailed contour map of the site is given in Postgate and Moorey (1976, fig. 1). The two connected east mounds rise to a height of about 5 m above plain level and cover approximately 28 ha. To the west, across a depression that may be an ancient river channel, is a 7 ha mound about 1 m lower in height. South of the latter is a so-called Uruk mound of perhaps 12 ha, 0.5 m lower still. A presence-absence tabulation is given in table 6 for a surface collection made in 1957 by the author and Dr. Vaughn E. Crawford.

Probable Ubaid. Early/Middle/Late Uruk-Jemdet Nasr-Early Dynastic I/II/III. It seems likely that there was a progressively increasing size of settlement until the late Early Dynastic period. Some later (Proto-Imperial or Sargonic) pottery was found in a drain, leading the excavators to speculate that there may have been a terminal Akkadian or even later building phase that is apparently unrepresented in the surface pottery now to be found on the site (Postgate and Moorey 1976, p. 157). On the other hand, a small number of later sherds (two large-spouted bowls, a channel-rim bowl, and a sherd with horizontal ribs, all of Akkadian or slightly later date, were included in the 1957 collection. While there may have been a shrine or some other commemorative structure erected here, this seems to imply an at most very limited post-Early Dynastic occupation.



*Appendix*

# The Southern Margins of Sumer

Archaeological Survey of the Area  
of Eridu and Ur

*Henry T. Wright*

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# Introduction

The archaeological survey of southern Sumer was planned early in 1965 as one step in the survey of lower Iraq, a project conceived and largely carried out between 1958 and 1975 by Robert McC. Adams of the University of Chicago's Oriental Institute. By 1965 only the Diyala plains and the region of ancient Akkad on the northern alluvium of the Tigris and Euphrates had been surveyed, and the reader may well query why we chose to jump to the extreme south for the next survey. We made this choice because we wanted a better understanding of settlement systems of the Ubaid period. It was in the south that the only complete Ubaid stratigraphic sequence, that at Eridu, was known. Furthermore, a variety of reports indicated that the Eridu depression, partially separated from the main alluvium by a sandstone ridge, might have a preserved early land surface on which both large and small Ubaid sites were exposed without many meters of obscuring later silt: (1) maps indicated that the plain around Eridu was several meters lower than the alluvium near Ur; (2) sterile sand at Eridu itself and at the nearby Ubaid site of Rejibah X was reportedly at plain level or even higher; and (3) a brief survey by Safar had located several small Ubaid sites not far from Eridu. With good survey evidence we could relate the patterns of technological specialization and social differentiation—implied by existing evidence from excavations—to patterns of population growth and land use as indicated by survey evidence. Understanding of the Ubaid would have provided a firm foundation for work on the later urban developments so well evidenced to the north around Warka. However, as is often the case with initial surveys, we were wrong. Geological changes had obscured most of the early land surfaces, and our data proved more relevant to later historical periods than to earlier ones.

Support for the fieldwork was provided in part by the Oriental Institute in the form of a new Land Rover and a small budget for travel and labor, and in part by a graduate fellowship from the National Science Foundation that paid the daily expenses of my wife, Fran Wright, and myself. We arrived in Baghdad on 10 October 1965 and spent

the greater part of the next three months there, studying materials from Eridu and related sites. The facilities of the new Iraq Museum were made available to us by Dr. Faisal al-Wailly, then director-general of antiquities, the late Sayyid Fuad Safar, then director of excavations, and the late Dr. Faraj Basmachi, then director of the museum. Through most of our stay we resided in the British School of Archaeology through the kindness of Dr. David Oates and Mr. Jeffrey Orchard. I profited then and throughout the subsequent years from the advice of Dr. Joan Oates regarding the problems of prehistoric archaeology in Iraq.

On 20 January 1966 we arrived at the excavation house at the ancient city of Ur, 15 kilometers southwest of the modern city of Nasiriyah. For the next three months we crisscrossed the areas around Ur, always accompanied by either Hajji Hosseyn ibn Aboud or Sayyid Mahsen ibn Nais, the site guards of Ur. The few official problems that arose were handled by the directorate's representative in Nasiriya, Sayyid Wa'il al-Ruba'i, and by Capt. Sabih al-Khafajeh of the national police. Much interest in our work was expressed by Shaykh Muhammad ibn Manshet of the Al-Ghizzi. We were also visited and helped by the engineers of Energoinvest, Inc., of Yugoslavia and of the Swiss Engineering Consultants. During the actual archaeological survey work, Mr. Nicholas Vester and Mr. Julian Wootten helped us for several days. This report has profited from close reading by Robert McC. Adams, John R. Alden, Curtis E. Larsen, and Matthew W. Stolper. Those failings that remain are entirely the author's.

## METHODS OF WORK

The survey was conducted under difficult conditions: we had neither accurate maps nor air photographs nor sophisticated mapping equipment. The base map for the survey was built up by triangulation from known points on the Baghdad-to-Basra Railway, angles being measured with a Brunton compass. To our relief, this base map

checked well with the air photographs we were able to examine after completing the survey.

Each day we visited from two to eight sites, the number depending on their size and their proximity to Ur. Our sweeps by Land Rover—on parallel lines from 0.5 to 1 kilometer apart, topography permitting—were such that we should miss no site more than 0.5 meter high. Some of the recorded sites were lower, and only on the southwest (where dunes were encroaching and travel was difficult) could we have missed many. We mapped each site with compass shots and pace measurement, noting any evidences of buildings, burials, kilns, or other features as the map was prepared. We noted the distribution of baked bricks on the assumption that their abundance indicated more prosperous settlements or parts of settlements. Other members of the survey group walked back and forth across the site at roughly 5-meter intervals collecting all bases, rims, and other diagnostic sherds. If the site was large or topographically complex, it was divided into several units, each separately collected. On very large sites, particularly to the southwest, time limitations forced us to compromise even this simple sampling approach. The collections resulting from this general collecting procedure were then examined in order to assess the last major occupation of the site, and the site was searched again specifically for diagnostic indicators of earlier, deeply buried occupations. Any such early artifacts were individually located on the site map. With this procedure we surveyed the area from the limits of modern cultivation on the northeast, typically congruent with the northeast flank of the ancient Euphrates levee running through Ur, to the edge of the sand dunes and salt flats on the southwest, typically close to the southwest of the flank of ancient Euphrates levee swinging south of Eridu. On the northwest, we recorded sites around the railway station and village of Bat-ha, and on the southeast we recorded sites around the railway station and ancient mound of Tell al-Lahm. In this area of about 1,010 square kilometers we recorded 192 sites, many of which were in fact groups of mounds. We also made trips along the modern Euphrates levee to the north of the survey area and deep into the desert to the fortress of al-Qusair (Finster and Schmidt 1976), but in no case was such survey complete. Sites of interest seen on these trips will be noted in passing in the text rather than included in the site catalog.

Each evening and each rainy day, we washed and numbered the sherd samples and checked them against such publications as were available to us in the field. Fortunately, there are many small sites with short occupations, and before long recurrent associations of ceramic types became apparent. The Ubaid and earlier phases were familiar because of our study of the Eridu ceramics in the Iraq Museum. Some ceramics of the Uruk, Jemdet Nasr, Early Dynastic, Agade, and Neo-Babylonian-Achaemenian periods at Ur had been published, and it was possible

to recognize these. Cassite and Ur III ceramics are relatively uniform throughout alluvial Mesopotamia, and we could identify them with the help of photographs of Nippur ceramics given to us by Adams. In the field, our problem was the early second millennium B.C.: the Isin-Larsa and Old Babylonian periods. Our tentative dating of two assemblages to these times was confirmed by Fuad Safar during a visit to Ur; comparable assemblages have only recently been published. As the fieldwork progressed and our maps grew, consideration of our tentative datings led to one conclusion: the preservation of land surfaces of the fourth millennium B.C. and earlier was poor because a major southern channel of the Euphrates flowed through the Eridu depression during the second and first millennia B.C., covering earlier surfaces almost everywhere. After useful discussions with Fuad Safar, Robert and Linda Braidwood, Bruce Howe, and Halet Cambel—all of whom visited us at Ur for several days—and after much thought, I decided to put aside work on the Ubaid period and focus on the settlement system of the Early Dynastic I period. The further survey work and small excavation that became the basis of my doctoral dissertation (Wright 1969) do not concern us here.

Upon returning to Baghdad in late May 1966, we began the analysis in earnest. We were kindly given residence in the home of Dr. Theresa Howard Carter. Through the prolonged efforts of Sayyid Mahmud al-Amin, we were able to examine air photographs of the Eridu area. Dr. Basmachi offered us a large room for a laboratory. We prepared a final base map (fig. 1) and began detailed recording of the sherds. We devised a taxonomy based on clay body, clay color, and form and tabulated the sherds from each sample. The sherds were then packed in a sturdy wooden case and stored in the Iraq Museum, only the tabulations being sent to Chicago for further analysis, a procedure that (for better or worse) prevents any revision of our typology. Final pottery type descriptions, tables, illustrations, and period maps were prepared in Chicago during the autumn of 1966. But the demands of completing the dissertation and subsequently preparing for a new job intervened, and the survey report was set aside until time became available.

I had intended to use this time to undertake a number of studies this present report does not contain. First, I had hoped to undertake a statistical study of the ceramic assemblages using one of the newly developed seriation or ordering techniques (e.g., Hole and Shaw 1967; Drennan 1976). However, since the approximate relative dating of these ceramic assemblages is not in doubt, such a study would serve primarily as an illustration or test of the available methods. This I leave to others. Second, I had hoped to undertake a detailed study of the cuneiform sources, both the few pieces we found during our survey and those published from Ur and other sites that were relevant to the geography of the area. This might be very



Fig. 1. Base map of the southern Sumer survey area, 1966.

useful, but I lack the full range of skills necessary for this task, and the number of fixed points—settlements whose ancient names are known—is limited. Such a study might be more successful if it included a broader area. Third, I had intended to undertake a formal locational analysis of some of the settlement patterns. This plan foundered on several points. In the first place, the average length of the defined ceramic periods is about three hundred years; it is risky to assume that the sites on any map were all occupied at the same time. In the second place, the settlement patterns are conditioned by the linearity of rivers and canals, and it would be necessary to adapt or develop a special locational theory to undertake such an analysis. In the third place, although our survey area is naturally bounded on the south and east, it is arbitrarily cut off on the west and north. Until very recently data on these areas has been unavailable.

The present report is primarily a descriptive document, presented in such a way that the data may be reworked and integrated with that from other areas of alluvial Mesopotamia. Broad interpretation is kept to that minimum necessary if the reader is to appreciate the special features of southern Sumer that condition any use to which the data might be put. One should not forget that this survey used elementary methods and that improved resurveys must be done in the future, using refined ceramic chronologies to solve the problems raised by this and other studies of ancient Mesopotamian settlement patterns.

### GEOGRAPHICAL NOTES

Some areas of the Mesopotamian alluvium, for example, parts of the Hilla and Marsh areas, are today similar to what they were in past millennia. Today, however, no river flows by Ur or Eridu, and what were once irrigated levees and freshwater marshes are shifting sand dunes and salt-crusted mud flats. Thus, even if we wished to do so, we could not extrapolate directly from the modern environment to past conditions in the area. Nevertheless, something can and must be said regarding geology and possible past geography if we are to understand the ancient settlement patterns.

Mesopotamia is on a tectonic boundary where the Arabian plate pushes against and slides under the Eurasian plate. Compression has folded the former sea bed between the two plates, raising the Zagros-Taurus mountain arc. Sediments eroded from these mountains have been deposited in the Tigris-Euphrates valley and beneath the Gulf, isostatically forcing the earth's crust farther downward and compressing the earlier sediments in the resulting basin. The area of interest to this discussion is on the south edge of this basin, where the layers of sediment rise gently upward to the south, lying directly on the relatively stable parts of the Arabian shield.

The bedrock geology of the immediate area of Ur and

Eridu is obscured by the present alluvium. In general, the geological strata dip gently down to the northeast. The edge of the alluvium southwest of Eridu is an outcrop of cherty limestone. Northeast of Eridu and southwest of Ur is another outcrop, this one of gypsiferous Dibdibba sandstone. This exposure rises and broadens to the southeast, where it conformably overlies a series of earlier strata; these in turn rest unconformably on the aforementioned cherty limestones of the Dammam formation. Thus the plain of Eridu is a cul-de-sac surrounded on three sides by bedrock outcrops. The gypsiferous sandstone ridge, locally known as the "Hazim," that separates the Eridu alluvium from the main Euphrates alluvium has been dated to the Pliocene by al-Naquist (1967). There are sites of the late fifth millennium B.C. associated with its present configuration. On the other hand, desert varnish is notable on pebbles only above an elevation of about 40 meters above sea level. In this area, pebbles with desert varnish occur on land surfaces with Middle Paleolithic tools dating to between 40,000 and 100,000 years ago. Therefore the flanks of the ridge must have been exposed more recently than the upper portion.

Another feature that may be very old is the line of large dunes more than 50 meters high that lies along the south edge of the alluvium, covering its border with the cherty limestones. A site of the early fifth millennium B.C. exists on these dunes; thus much of their bulk must have accumulated in earlier times. As far as I know, there are no studies of the minerology of the dune constituents. Whether their source was the desert to the south, the alluvium itself exposed by the rivers downcutting in response to lower sea levels in times of glacial maxima, or both is not yet known.

In short, it seems that the Hazim and the dunes had assumed more or less their present form as sea level approached its present height about 4000 B.C. (Larsen 1975), flooding the incised channels of the Tigris and the Euphrates and much of the Mesopotamian basin, thus creating the present-day Gulf. Concomitant natural levee formation would have begun along the many braided channels of the river. As soon as the levee on the southern channel of the Euphrates had reached the Ur area, the northwestern open end of the Eridu plain would have been obstructed and would have begun to receive flood-season discharge from the Euphrates. In years of major discharge through more permanent breaches in the levee, a lake or marsh may have been formed, with waters finding an outlet through a breach in the Hazim. This occurred at a point between sites EP 131–33 and EP 134–35, about 14 kilometers east-northeast of Eridu. Since EP 134 has a number of Late Ubaid sherds, it seems likely that this outlet had been scoured to more or less its present form by 4000 B.C. Since this date, we can propose that the Eridu depression has been subjected to drastic cycles of environmental change as a function of local changes in the

Euphrates channels. If water moved down the southernmost Euphrates channel into the Eridu depression, a freshwater lake would form southeast of Eridu and drain through the break in the Hazim. Salt would be removed from the basin, and ground moisture would increase along the river channel. Poplar, willow, and tamarisk would thrive on the riverbanks, and on the levees a brushy cover of *Prosopis* would survive in uncultivated areas. The lake itself would probably support a marshy vegetation, predominantly reeds such as *Phragmites*, which now surround the Hor al-Hammar. When the southernmost Euphrates channel ceased to flow, the lake would become a salty mud flat, with only a few salt-loving, drought-tolerant plants surviving on the former levees and channel bottoms. On the dunes only the *Halyxylon*, a small tree, would flourish, protected from woodcutters by kilometers of barren alluvial desert. Eventually more

northerly Euphrates channels would become obstructed, and water would again shift into the southern channel, initiating another cycle.

This natural cycle in the Eridu basin has been deduced from a minimum of assumptions and must be verified by geological surface mapping and leveling, the study of sediment cores, and other techniques. It is possible that such study would reveal that this proposed cycle never ran its course, since after 4500 B.C. human communities were sufficiently numerous that their efforts to control the flow of water would affect the distribution of vegetation and deposition of silt layers. Before this interaction of natural and cultural factors can be sketched, something must be said regarding the archaeological chronology upon which our understandings of community and channel shifts are based.

## The Sequence of Ceramic Assemblages

This section presents the bases for dating surveyed sites. It covers ceramic developments in this area from about 5000 B.C. to at least 400 B.C. It is based on a preliminary study of apparently briefly occupied sites in southern Sumer, sorted from the universe of 192 sites located during 1966.

A presentation like this is necessary because the available published material is biased in favor of unbroken and unweathered vessels from graves, while surface collections generally yield weathered sherds from domestic areas. A study based on the manipulation of surface collection statistics is bound to have errors, but until more stratified sherd samples are carefully reported in print, this approach will have to suffice.

In the pottery descriptions I attempt to use a simple terminology. A "period" is defined on the basis of a series of surface collections in which a number of types occur together. Within periods, "complexes" are defined by series of surface collections in which either a few types cluster together or a type is unusually common. A complex may represent a portion of a period, or it may represent a ceramic group with special functions. When more and better samples are available, this rather artificial division will be unnecessary.

The terms for parts and attributes of vessels, and their combinations into named types, are tentative. Each ceramic type is designated by a code beginning with the letters RJ for rim of jar, RB for rim of bowl, B for base, and O for other. Following the letters is a number indicating the period of most common occurrence. The number 1 represents the earliest Eridu and Hajji Muhammad periods, and 10 represents the latest Neo-Babylonian and

later periods. Next follows a hyphen and a number serially assigned for each variant. Thus, RB8-2 is the second described bowl rim type of the Late Larsa–Old Babylonian period, a type that also happens to occur during the preceding Early Larsa period. Each type is also given an informal descriptive name. In the sections for each period there is first a general statement about the ceramics of the period, then a list of type descriptions. Each description includes the type number, the name, a figure reference, and any other observations. The site catalog gives the counts of types from a series of collections. This allows the reader to examine patterns of the co-occurrence of types in "periods" and "complexes." Were this study to be redone, I might well present site-by-site corpora as Adams and Nissen did in *The Uruk Countryside* (1972); thus presenting maximal information on ceramic variations and allowing complete reevaluation when adequately described stratified ceramics are available for the area. However, since the sherds were recorded typologically, they must be presented in this way.

### THE ERIDU AND HAJJI MUHAMMAD PERIODS

Ceramics of these early periods are not well represented in our surface collections, and, since Lloyd and Safar (1948) and Oates (1960) have presented an extensive description of these materials, great detail is not necessary here.

Eridu period ceramics have a temper of medium-sized sand particles, a yellow to buff body, and a similarly colored slip. The most common form among the exca-

vated rims from the Eridu Temple Sounding is a small to medium-sized hemispherical bowl. Their exteriors characteristically have a motif of parallel oblique painted lines. In the earlier layers of this period, the bowl interiors are usually decorated with pendant triangles; in later layers of this period (XVI to XIV) grids and checkerboards become common. The only Eridu sherd recovered in the survey is an overfired example with the later checkerboard interior (fig. 2a), although other sherds are known from Ur and Tell Ubaid (Oates 1960, n. 18).

Hajji Muhammad period ceramics have a similar temper and slip, but usually they are harder and have a buff to green color. The paint is matte or glossy. There is much variation in vessel shape in the excavated samples, but only fragments of the distinctive carinated bowls have been recovered in the survey samples. These medium to large shallow bowls have a broad outflared rim. The exterior painting is usually bold zigzag bands; the rim interiors usually have an oblique crosshatch (fig. 2b), and base interiors have grids (fig. 2c) or arrangements of triangles (fig. 2d). As will be discussed shortly, a simpler variant of this bowl continues into Early Ubaid times and is more common in the survey collections than are these classic forms.

## THE EARLY UBAID PERIOD

Surface sherds of this period are found mixed with Late Ubaid pieces, but they can be recognized by comparison with sherds from the Eridu Temple Sounding layers X and IX. These ceramics have a fine sand temper or no visible temper and vary in color from buff to green. The most frequent surface indicator of Early Ubaid occupations is the carinated bowl with simple black bands (RB2-1).

RJ2-1: Interior-ledge-rim jar (fig. 2h). In this period these have a solidly painted rim and a complex shoulder motif of curved or crosshatched lines.

RB2-1: Carinated bowl with simple black bands (fig. 2e). These are thinner and less sharply carinated than earlier Hajji Muhammad bowls, and the paint is matte, never glossy. The base interiors often have a rosette motif with lines radiating from a central dot (fig. 2f). Unpainted variants occur.

RB2-2: Medium-sized deep bowl with interior triangle motif (fig. 2g).

RG2-3: Flat-lip basin with interior or rim-top triangle motif. This is similar to RB2-2 but heavier, larger, and with a flattened rim. Plain and simple banded variants are common. All these variants may also occur during the preceding Hajji Muhammad phase.

RB2-4: Bell-shaped cup. Many variants of these fine vessels, both plain and painted, are known from Eridu (Lloyd and Safar 1948, pl. III).

## THE LATE AND TERMINAL UBAID PERIOD

The ceramics of this period have a paste and color similar to those of the Early Ubaid, but there is more green color, warping, and surface sludging from the overfiring of salt-impregnated clays. Many vessels exhibit the surface scoring characteristic of wheel finishing.

Sites with dominant surface assemblages of this period are recognizable from the fragments of painted sherds, particularly of incurved bowl rims (RB3-7 to 10) and ledge rim bowl rims (RB3-11 and 12) and quantities of clay sickle fragments (03-1), though the latter also continue into later periods. A study of statistics on the ceramics from Eridu by G. L. Barnes (pers. comm.) shows that at least two complexes are separable. The Late Ubaid complex is known from Eridu Temple Sounding, levels VII and VI, and Hut Sounding, level V. It has high-necked jars with completely painted (RJ3-3) or banded (RJ3-2) necks; plain forms are rare. Among the medium-sized bowls, the ledge rim (RB3-11, 12) is more common than the incurved form, and both frequently have lip and interior motifs such as oblique lines, curved lines, or triangles. The Terminal Ubaid complex (cf. Wright et al. 1975, p. 140) is known from the Eridu Hut Sounding, level IV. The high-necked jars have unpainted collars (RJ3-1). Among the medium-sized bowls, the incurved form seems to be more common than the ledge-rim form, and both have solid painting or bands rather than geometric motifs. More than 35 percent of the incurved forms have impressed combing on the interior (RB3-10). Simple bowl forms are frequently unpainted. A deep basin with exterior ridges also seems to be typical (RB3-15, 16).

RJ3-1: High-neck jar, unpainted collar. These range from medium to large. The bodies of these vessels are probably hand-built and finished, but the rims may have been wheel-finished.

RJ3-2: High-necked jar, painted bands (fig. 2i). The illustrated example is relatively large.

RJ3-3: High-neck jar, completely painted collar. This form is rare, occurring in both Early Ubaid and the beginning of Late Ubaid at Eridu.

RB3-1: Hemispherical bowl, unpainted. This form has a simple rounded lip and is usually relatively shallow. None of the variants are useful chronological indicators. These and other bowls are apparently wheel-finished.

RB3-2: Hemispherical bowl, painted band.

RB3-3: Hemispherical bowl, painted interior decorations. Doubtless future work will reveal chronologically distinctive variants.

RB3-4: Small deep bowl, unpainted. Complete examples from the cemeteries at Ur (Woolley 1956, pls. 17-19) and Eridu (Lloyd and Safar 1948, pl. III) indicate that this form typically had a ring base.

RB3-5: Small deep bowl, painted bands.

RB3-6: Small deep bowl, painted motifs (fig. 2j). On



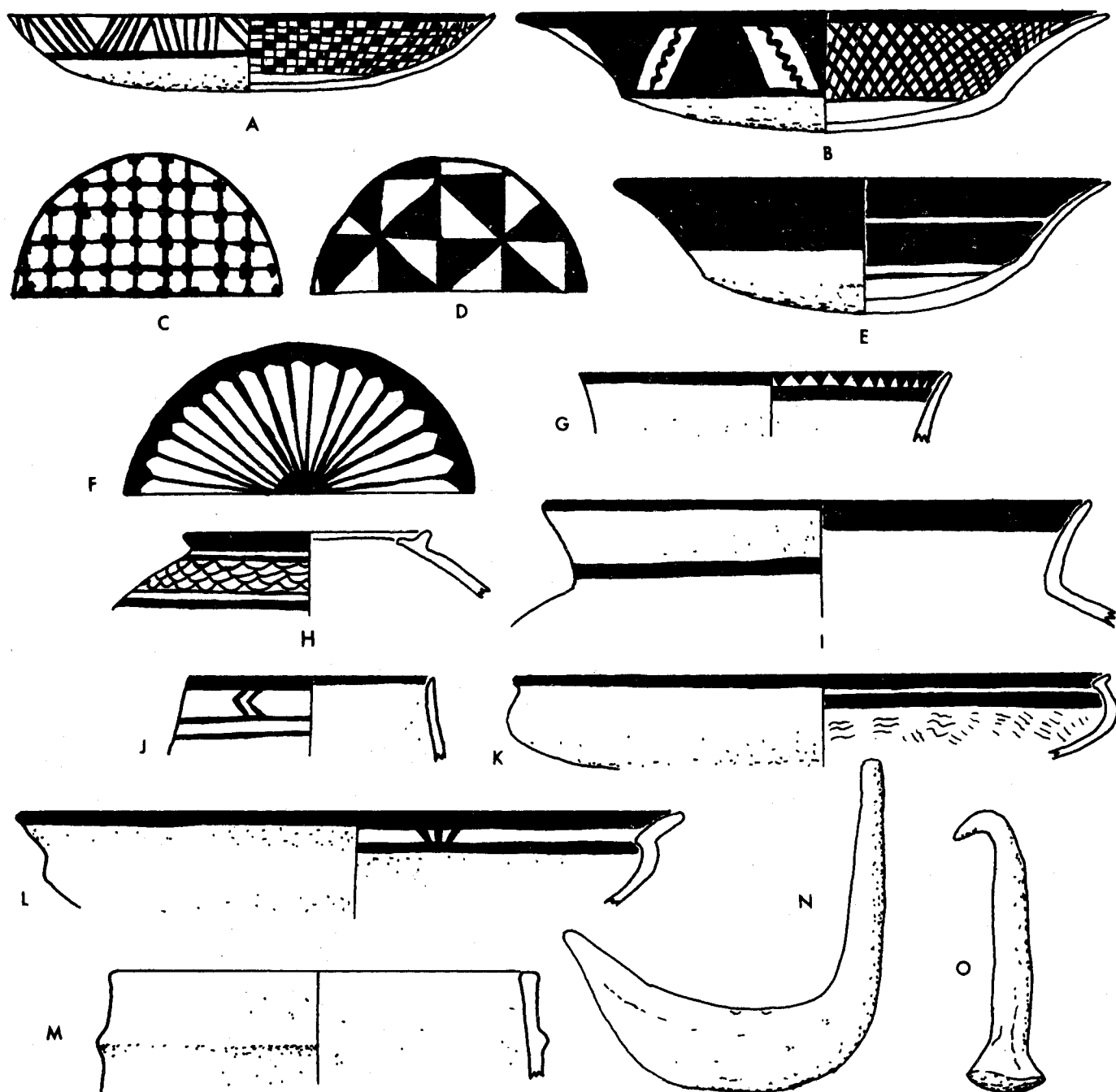


Fig. 2. Ceramics of the Eridu, Hajji Muhammad, and Ubaid periods (2/5). (N.b.: B and P indicate Munsell color readings for clay body and paint respectively, when available. D indicates diameter when relevant.)

- a. Eridu period bowl, EP-104.
- b. Hajji Muhammad period carinated bowl, B: 2.5Y 4/2, P: 10YR 2/0, EP-104.
- c. Hajji Muhammad period bowl interior motif, EP-3.
- d. Hajji Muhammad period bowl interior motif, EP-104.
- e. RB2-1, carinated bowl, B: 5Y 6/3, P: 10YR 3/1, EP-29.
- f. RB2-1, bowl interior motif, B: 5Y 7/2, P: 5Y 3/1, EP-38.
- g. RB2-2, deep bowl, B: 5Y 4/1, P: 10YR 3/1, EP-141.
- h. RJ2-1, interior-ledge-rim jar, B: 5Y 7/4, P: 10YR 2/1, EP-141.
- i. RJ3-2, high-necked jar, B: 5Y 5/4, P: 2.5Y 2/0, EP-141.
- j. RB3-6, small deep bowl, B: 2.5Y 5/4, P: 10YR 2/1, EP-104.
- k. RB3-10, incurved bowl with flat lip, combed interior, B: 5Y 7/4, P: 10YR 3/1, EP-104.
- l. RB3-12, ledge-rim bowl, B: 5Y 5/4, P: 7.5YR 2/0, EP-29.
- m. RB3-13, deep flat-lip basin, B: 5Y 5/4, EP-98.
- n. O3-1, clay sickle, B: 5Y 5/4, EP-98.
- o. O3-2, clay muller, B: 5Y 6/4, EP-98.

## Appendix: The Southern Margins of Sumer

the exterior are horizontal bands, between which are placed variously oriented triangles, zigzags, grids, and other rare motifs. No sample is large enough to allow study of the chronological and spatial variations in these motifs.

RB3-7: Incurved bowls with flat lip, unpainted.

RB3-8: Incurved bowls with flat lip, interior and exterior painted bands.

RB3-9: Incurved bowls with flat lip, painted motifs. These are usually curved or zigzag lines below the interior band.

RB3-10: Incurved bowl with flat lip, combed interior (fig. 2*k*).

RB3-11: Ledge-rim bowl, completely painted rim.

RB3-12: Ledge-rim bowl, painted motifs (fig. 2*l*), triangles, zigzags, and oblique lines are all found on the ledge rims.

RB3-13: Flat-lip basins, unpainted.

RB3-14: Flat-lip basin, painted bands. These are rare and may be a final development of the similar forms known from the Early Ubaid period (RB2-3).

RB3-15: Deep flat-lip basin with exterior ridge, unpainted (fig. 2*m*).

RB3-16: Deep flat-lip basin with exterior ridge, painted. The few painted examples have two horizontal bands enclosing curved lines.

03-1: Clay sickles (fig. 2*n*). The maximum use of these items in this area seems to be during these periods. However, the typical smaller form continues later, and so the presence of small sickle fragments in a collection is considered only as suggestive of Ubaid cultivation. Note that many stray clay sickle finds are close to Ubaid sites but far from Uruk sites and therefore are more likely to be Ubaid. A number of our examples exhibit retouch on the blades.

03-2: Clay muller (fig. 20). These are often termed "bent clay nails" in the literature. Our examples, like the excavated examples from Ras al-'Amiyah (Stronach 1961, p. 107), often show signs of use as a pestle. These occur both before and after the Late and Terminal Ubaid periods.

03-3: Chert hoes. Bifacially flaked implements similar to certain varieties of late Acheulian bifaces.

### URUK PERIOD

Except where noted, ceramics of this period surviving on the surface have a distinctive temper of fine rounded sand and coarse crushed rock, either calcite or quartz. This grit constitutes 30 percent of the paste. The body is generally dark green or gray.

Sites with dominant surface assemblages of this period are marked by simple straight-rim jars (RJ4-1), beveled-rim bowl rims (RB4-1), large strap handles (04-1, 04-2), and large clay sickles. Even when weathering has removed

most distinctive ceramic items, a scatter of rough, fire-cracked chert flakes and limestone rubble suggests Uruk occupation, for Uruk ceramics were often associated with such debris.

RJ4-1: Simple straight-rim jars (fig. 3*a-c*): These are distinguished by simple horizontal combing on the body exterior and by frequent attachment of 04-1 and 04-2 handles.

RJ4-2: Thick-rim jars (fig. 3*d-e*): Distinguished by the triangular section of the low outcurved rim.

RJ5-4: Flared expanded-rim jars (fig. 4*j, k*): These are rare.

RB4-1: Beveled-rim bowl (fig. 3*f, g*): Distinguished by predominant gray brown color, straw temper, and finger marks resulting from manufacture in a press mold.

RB5-2: Conical-bowl rim (fig. 6*a-c*).

04-1: Twisted strap handle (Fig. 3*h*): Distinguished by flattened section and relatively large size. These are later Uruk.

04-2: Plain strap handle (fig. 3*i*): Distinguished by flattened section, double grooving, and relatively large size.

04-3: Twisted lug handle (fig. 3*j*): Distinguished by finer twistings and horizontal placement on the vessel.

04-4: Clay cones (fig. 6*j-l*): Rare. One example has a hollow head.

05-2: Spouts (fig. 5*g-j*). Similar to later forms.

04-5: Droop spout: These are rare and perhaps late in this period. Distinguished by long conical spout turned downward at a marked angle. Often there is a slightly thickened rim on the spout.

04-6: Stamp-decorated sherds: These are rare and perhaps early. Distinguished by either individual crescentic impressions or rocker impressions on the upper body of a small jar.

04-7: Combed sherds: These are common. Distinguished by complex overlapping spirals and curves, often partially smoothed over. Simple combing continue into later periods.

04-8: Large clay sickles: Very large forms with handles thicker than 1.9 cm and blades wider than 5.5 cm may be more typically Uruk in the Eridu area.

### JEMDET NASR AND EARLY DYNASTIC PERIOD

Except where noted, ceramics of this period have inclusions of fine sand and very finely crushed rock, generally calcite. The latter is generally observable only under a microscope. The paste is often buff to reddish, but greenish overfired examples occur. Jars, large bowls, and the upper portions of conical bowls are often covered with a cream slip or wash.

Within this period, three complexes can be isolated. One is distinguished by rarity of decorated types, the

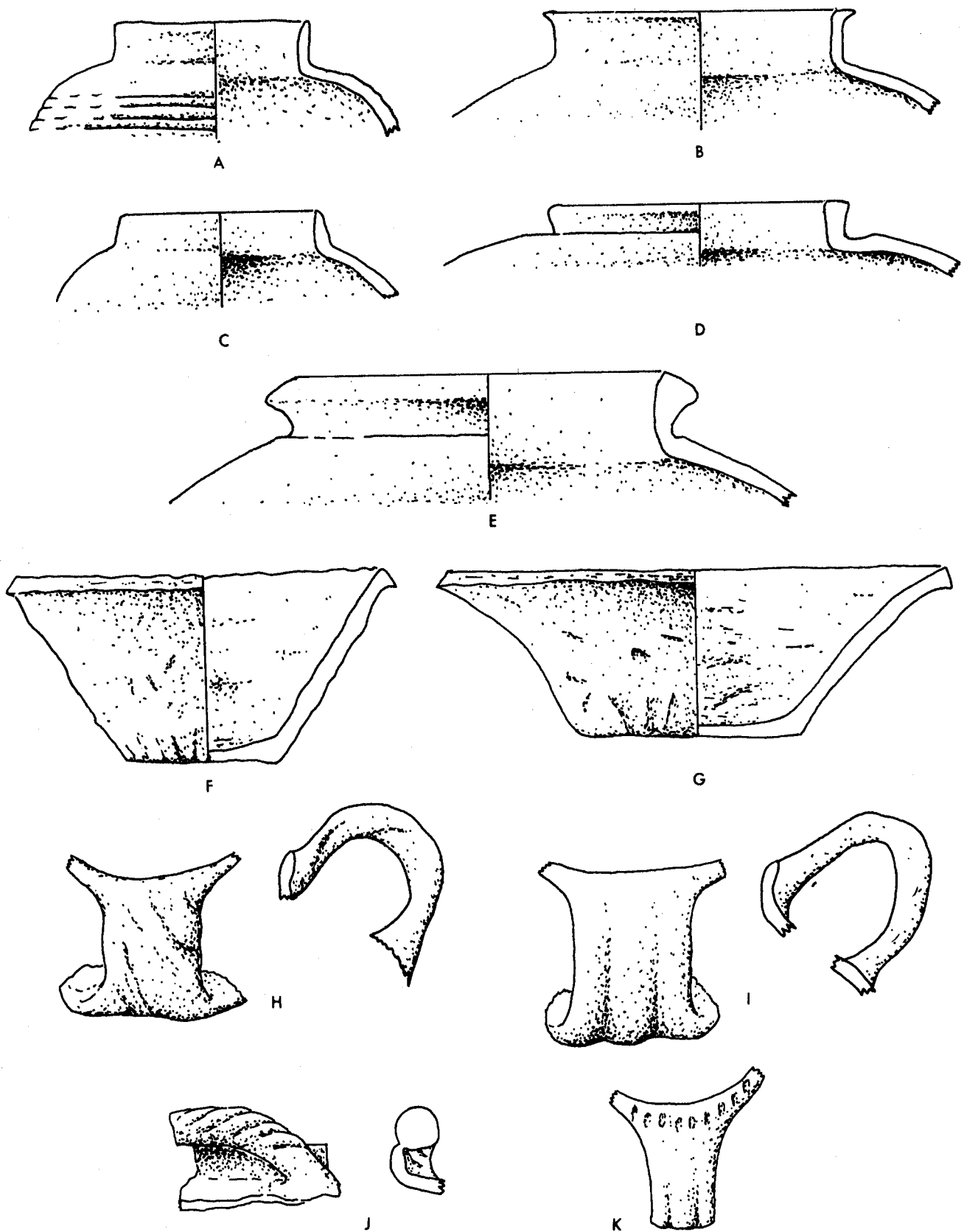


Fig. 3. Ceramics of the Uruk period (2/5).

- a. RJ4-1, straight-rim jar, B: 2.5Y 6/4, EP-171.
- b. RJ4-1, straight-rim jar, B: 5Y 5/4, EP-171.
- c. RJ4-1, straight-rim jar, B: 5Y 6/4, EP-171.
- d. RJ4-2, thick-rim jar, B: 5Y 6/3, EP-3.
- e. RJ4-2, thick-rim jar, B: 5Y 7/3, EP-3.
- f. RB4-1, beveled-rim bowl, B: 5Y 6/3, EP-3.

- g. RB 4-1, beveled-rim bowl, B: 2.5Y 7/4, EP-3.
- h. O4-1, twisted strap handle, B: 5Y 5/2, EP-29.
- i. O4-2, plain strap handle, B: 5Y 6/4, EP-29.
- j. O4-3, twisted lug handle, B: 5Y 5/4, EP-171.
- k. O4-2, plain strap handle. B: 5Y 7/4, EP-171.

occurrence of small flat and twisted strap handles, and the high frequency of rim alterations on conical bowls, most distinctively a slightly beveled-rim form (RB5-4). This is probably a Jemdet Nasr complex. The second complex is distinguished by the frequent occurrence of hatched strips, reserved slip, and incised and excised jar shoulders (05-5, 05-6, 05-7), solid-footed goblets (B5-5), double-rim dishes (05-1), and flat-rim jars (RJ5-5). This is an Early Dynastic I complex. The third complex is distinguished by low frequencies of ledge-rim jars (RJ5-1), so common in the previous two complexes; high frequencies of the simple flared-rim jars (RJ5-3), a scarcity of decorated sherds except for hatched strip (05-5). This is probably an Early Dynastic III complex. It is unfortunate that the Jemdet Nasr and Early Dynastic III complexes are indicated primarily by the absence of things, for it is difficult to establish their presence unless they form the dominant complex on a site.

Sites with dominant assemblages of this period are marked by quantities of conical bowl fragments, cream-slip sherds, and denticulate sickle blades.

RJ4-1: Simple straight-rim jars (fig. 3*a, c*): This type is rare in surface collections from sites of this period, apparently because the potters were using a low-fired body that disintegrates quickly when exposed. Those that occur are little different from their Uruk predecessors, though loop handles are replaced by simple oval lugs attached to the rim. None of these lugs have been found in surface collections, but they are frequent in excavated samples (Wright 1969, p. 68, fig. 18*e*).

RJ5-1: Ledge-rim jars (fig. 4*a-c*): There is a possibility that sharp neck-shoulder and shoulder-body junctures are more typical of the Jemdet Nasr complex. Vessels of this type frequently have shoulder decorations (see below).

RJ5-2: Band-rim jars (fig. 4*d-g*): These may be more frequent in Jemdet Nasr times.

RJ5-3: Simple round-rim jars (fig. 4*h, i*): Distinguished by a coarse, often dark green body. Probably more common in Early Dynastic III.

RJ5-4: Flared expanded-rim jars (fig. 4*j, k*): Distinguished by light body color; high, gently outcurved neck; and slight, often concave bevel.

RJ5-5: Flat-rim jar (fig. 5*a*): May be more frequent in Late Early Dynastic I. Distinguished by hard, very sandy paste, and gray to light green color.

RB5-1: Large bowl (fig. 5*b*): These are common in excavated Early Dynastic I material but occur in Jemdet Nasr times as well. Often with flattened rim and hatched strip below rim. Sometimes lightly chaff-tempered.

RB5-2: Simple conical bowl (fig. 6*a-c, g*): The significance of the considerable variation in rim thickness and angle is not apparent.

RB5-3: Braced conical-bowl rim (fig. 6*d*): Probably limited to Jemdet Nasr and Early Dynastic I. Distinguished

by the thickened band on the exterior below the rim.

RB5-4: Beveled conical-bowl rim (fig. 6*e*): Probably limited to Jemdet Nasr.

RB5-5: Thickened conical-bowl rim (fig. 6*f*).

RB5-6: Simple stone-bowl rim (fig. 5*c*): Very common in Early Dynastic I sites. Made of gypsum or local limestone, both coarse, porous materials.

B5-1: Pinched ring base (fig. 5*d*): Distinguished by finger marks around ring. Often scraped on interior.

B5-2: Flat base (fig. 5*e*): Distinguished by slight unevenness on base. Often scraped on interior.

B5-3: Wide-mouth conical-bowl base (fig. 6*i*): Base string cut.

B5-4: Narrow-mouth conical-bowl base (fig. 6*h*): Base string cut.

B5-5: Solid-footed goblet base (fig. 6*j*): Base string cut. Frequently asymmetrical. These are typically Early Dynastic I.

04-1: Twisted strap handle: Jemdet Nasr and Early Dynastic I examples of this type are small and round in section. Some were attached to ledge-rim jars (RJ5-1) rather than simple straight-rim jars (RJ4-1).

04-2: Plain strap handle (fig. 3*k*): Jemdet Nasr and Early Dynastic I examples of this type are small, often with only one groove.

04-3: Twisted lug handle: Perhaps present in Jemdet Nasr.

04-4: Clay cones (fig. 6*j-l*): These occur no later than Jemdet Nasr. They vary greatly in size. Some show marks of the potter's knife across the head. Some are chipped across the head and some are chipped on the side. This may reflect functional differences.

05-1: Double-rim dish (fig. 5*f*): Distinguished by high outside rim, low inside rim, sometimes slightly outcurved with a small gap through it, and by pitting inside the inner rim, perhaps resulting from gentle pounding.

05-2: Spouts (fig. 5*g-j*): These vary from short to long, straight to slightly curved, and are generally slightly conical. Long forms are rare in Early Dynastic III.

05-3: Punctate decorated sherds: Distinguished by an irregular line of slits, either vertical, oblique, or horizontal, on jar shoulders.

05-4: Hatch-strip decorated sherd (fig. 6*m*): Strip varies from wide to narrow, hatching varies from wide to narrow and vertical to oblique. Varieties of this have been called "cable ornament."

05-5: Reserved-slip decorated sherd (fig. 6*n*): In our collections this occurs on Early Dynastic I sites.

05-6: Incised sherd with excised triangles (fig. 6*o*): This combination of shoulder decorations is apparently Early Dynastic I throughout the alluvium. The incising is generally oblique crosshatched within triangles or bands radiating out from the neck, or within concentric circles incised on the jar neck.

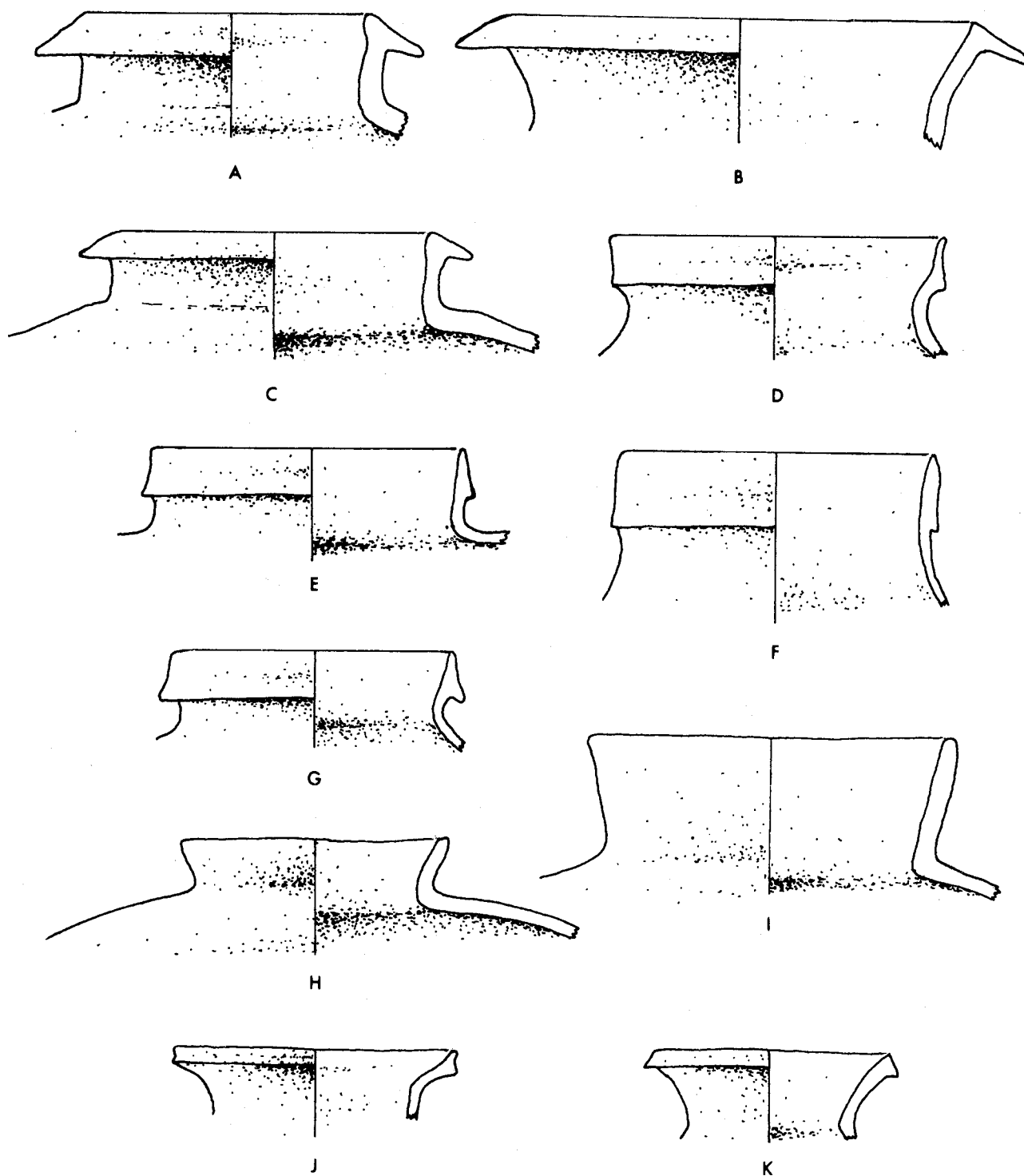


Fig. 4. Ceramics of the Jemdet Nasr and Early Dynastic period (2/5).

- |  |  |
|--|--|
| a. RJ5-1, ledge-rim jar, B: 5Y 7/3, EP-29.   | g. RJ5-2, band-rim jar, B: 5Y 7/4, EP-127.           |
| b. RJ5-1, ledge-rim jar, B: 2.5Y 7/2, EP-47. | h. RJ5-3, round-rim jar, B: 5Y 7/2, EP-30.           |
| c. RJ5-1, ledge-rim jar, B: 10YR 7/2, EP-47. | i. RJ5-3, round-rim jar, B: 2.5Y 6/2, EP-30.         |
| d. RJ5-2, band-rim jar, B: 2.5Y 7/4, EP-127. | j. RJ5-4, flared expanded-rim jar, B: 5Y 6/2, EP-29. |
| e. RJ5-2, band-rim jar, B: 10YR 6/3, EP-4.   | k. RJ5-4, flared expanded-rim jar, B: 5Y 7/3, EP-29. |
| f. RJ5-2, band-rim jar, B: 2.5Y 3/0, EP-5.   |  |

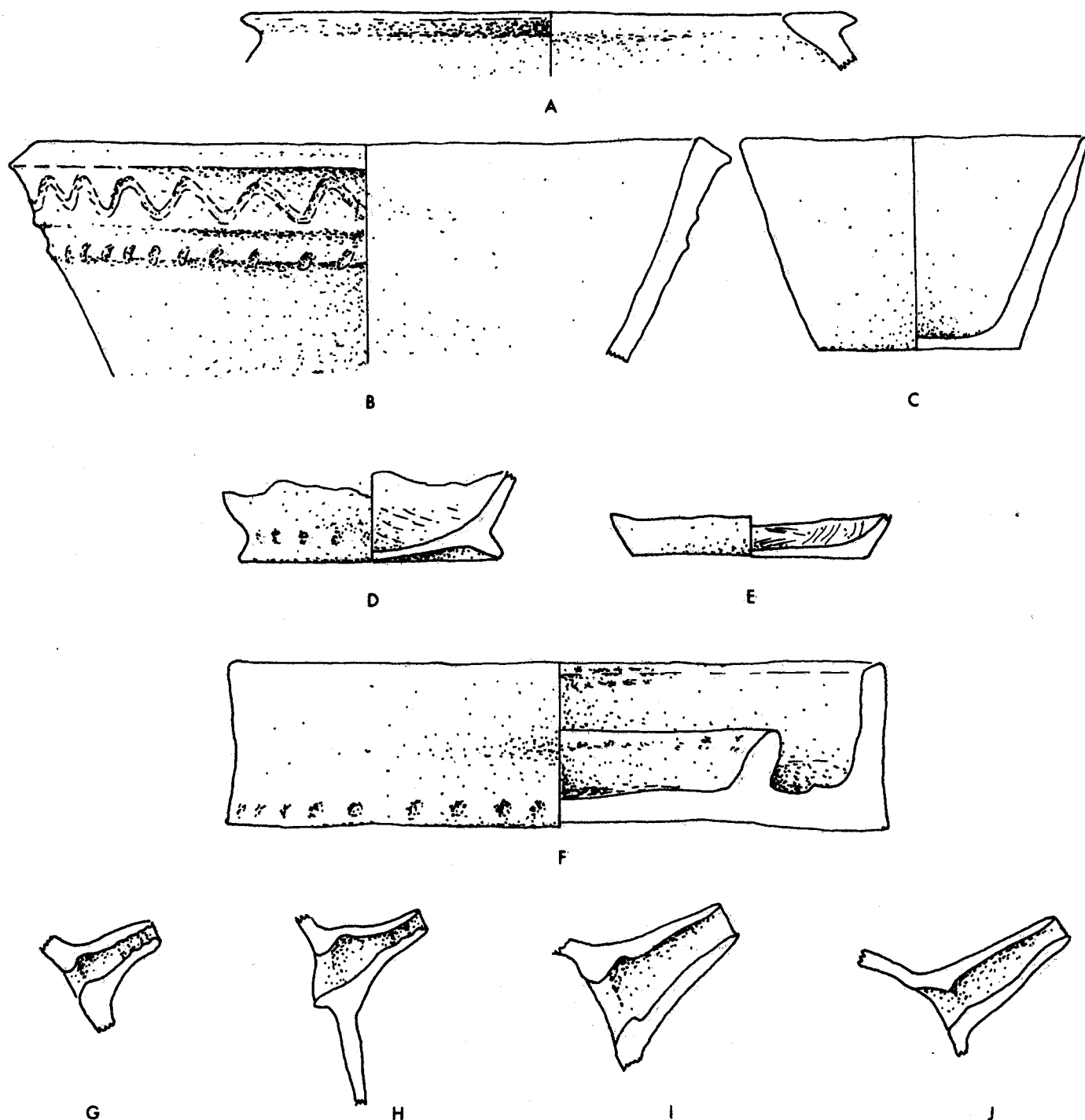


Fig. 5. Ceramics of the Jemdet Nasr and Early Dynastic period (2/5).

- |   |                                     |
|---|-------------------------------------|
| a. RJ5-5, flat-rim jar, B: 5Y 7/3, EP-47.       | f. O5-1, double-rim dish, EP-79.    |
| b. RB5-1, large bowl, B: 5Y 6/4, EP-142.        | g. O5-2, spout, B: 10YR 6/3, EP-47. |
| c. RB5-6, stone bowl, calcite, EP-156.          | h. O5-2, spout, B: 5Y 7/3, EP-47.   |
| d. B5-1, pinched ring base, B: 10YR 8/3, EP-30. | i. O5-2, spout, B: 5YR 6/4, EP-29.  |
| e. B5-2, flat base, B: 5Y 6/4, EP-22.           | j. O5-2, spout, B: 2.5Y 7/4 EP-3.   |

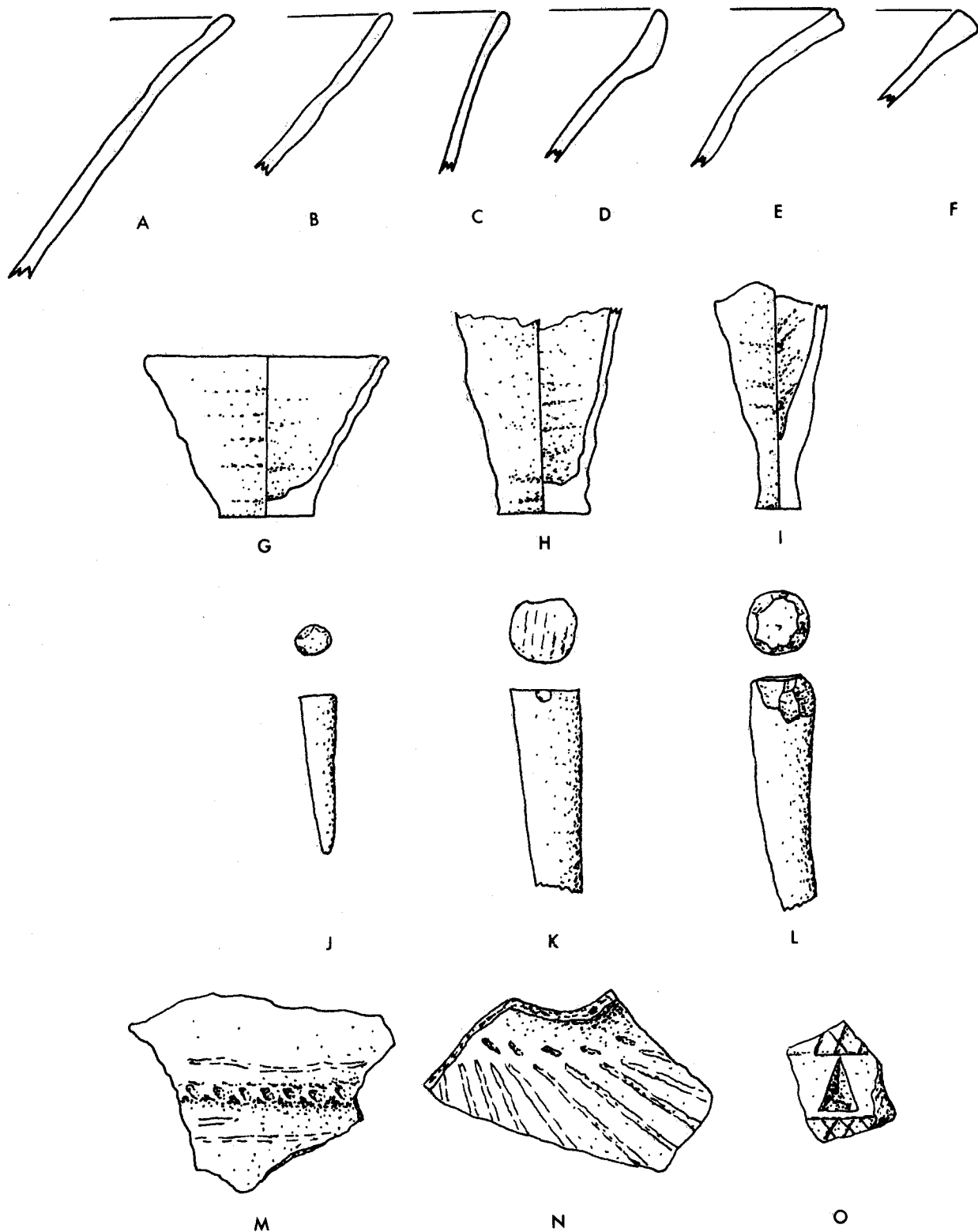


Fig. 6. Ceramics of the Jemdet Nasr and Early Dynastic period (2/5).

- a. RB5-2, conical-bowl rim, B: 2.5Y 2/0, D: 32, EP-60.
- b. RB5-2, conical-bowl rim, B: 5Y 5/4, D: 16, EP-60.
- c. RB5-2, conical-bowl rim, B: 5Y 5/4, D: 14, EP-60.
- d. RB5-3, braced conical-bowl rim, B: 10YR 5/4, D: 48, EP-60.
- e. RB5-4, beveled conical-bowl rim, B: 2.5Y 3/0, D: warped, EP-60.
- f. RB5-5, thickened conical-bowl rim, B: 10YR 5/3, D: 38, EP-60.
- g. RB5-2 on B5-3, conical bowl, B: 7.5YR 6/6, EP-30.
- h. B5-4, narrow-mouth goblet base, B: 7.5YR 6/5, EP-30.
- i. B5-5, solid-footed goblet base, B: 7.5YR 5/6, EP-82.
- j. O4-4, clay cones, B: 5Y 6/3, EP-5.
- k. O4-4, clay cones, B: 5Y 7/4, EP-3.
- l. O4-4, clay cones, B: 2.5Y 7/4, EP-127.
- m. O5-4, hatched strip decoration, B: 5Y 7/4, EP-79.
- n. O5-5, reserved-slip decoration, B: 2.5Y 6/2, EP-29.
- o. O5-6, incised-excised decoration, B: 2.5Y 7/4, EP-79.

## Appendix: The Southern Margins of Sumer

05-7: Denticulate sickle blade: Fine denticulations may be more common in the Jemdet Nasr, and coarse denticulations may be more common in Early Dynastic I.

### AKKADIAN PERIOD

Single-component Akkadian sites are very rare in the survey area, so a complete complex cannot be defined. Certain distinctive types isolated from mixed collections are presented.

Ceramics of this complex are tempered with either small quantities of fine sand or small quantities of vegetal matter. They vary from buff to light tan.

Sites with dominant surface assemblages of this period are marked by quantities of ridged sherds (cf. RJ6-2 and RJ6-3).

RJ6-1: Narrow ledge-rim jars (fig. 7*a, b*): Distinguished by a gently outcurved neck and slight ledge, often concave on top. This is probably a development from RJ5-4 and may well occur earlier.

RJ6-2: Ridged thickened-rim jar (fig. 7*c*): Distinguished by wide mouth and slightly outcurved rim, triangular in section.

RJ6-3: Ridged rounded band-rim jar (fig. 7*d*): Distinguished by rounded rim folded over to leave a small crease under the rim (see illustration).

RB5-2: Conical-bowl rim (fig. 6*a-c*).

RB6-1: Fine carinated vertical-rim bowl (fig. 11*b*): Distinguished by relative thinness and by concavity of the vertical rim.

B5-4: Narrow mouth conical-bowl base (fig. 6*h*).

06-1: Fine comb-decorated sherds (fig. 7*e, f*): Distinguished by straight combed rows alternating with wavy combed rows, often between ridges. These are common during this period but certainly occur both earlier and later.

### UR III AND EARLY LARSA PERIOD

Ceramics of this period are generally lightly chaff tempered and buff to yellowish in color.

Two complexes are recognized within the period. In one, the High band-rim jar (RJ7-1) is frequent. This may be an Ur III complex. In the other the single grooved band-rim jar (RJ7-3) and the rolled-rim jar (RJ8-1) are frequent. This may be an Early Larsa complex. Sites with dominant assemblages of this period are generally marked by the occurrence of double grooved band-rim jars (RJ7-2).

RJ7-1: High band-rim jars (fig. 8*a, b*): Distinguished by high, gently outcurved band rim.

RJ7-2: Double groove band-rim jar (fig. 8*c, d*).

RJ7-3: Single groove band-rim jar (fig. 8*e, f*).

RJ7-4: Grooved square-rim jar (fig. 8*g*): A large, wide-mouth vessel with deep wide grooved and flattened

rim, square in section. Perhaps a development from RJ6-2.

RJ7-5: Flattened rolled-over rim: In these complexes this type includes vessels transitional between RJ7-4 and RJ8-1.

RJ8-1: Rolled-rim jar (fig. 10*a, b*).

RB6-1: Fine carinated vertical-rim bowl (fig. 11*b*).

RB8-1: Band-rim bowl (fig. 10*g*): Rare.

RB8-2: Multiple-groove simple-rim bowl (fig. 10*h*).

RB9-2: Shallow conical bowl (fig. 12*b*).

B7-1: Disk base (fig. 9*a*): Frequently has a concavity in interior.

B7-2: Large button base (fig. 9*b*): Distinguished by relatively large, round base separated from rounded vessel bottom by a sharp crease, and by rounded concavity in bottom of base.

B7-3: Small conoidal base (fig. 9*d*): Distinguished by an incurved base coming to point, slight rounded nipple, or slight flat area.

B7-4: Small button base (fig. 9*e*).

B7-5: Ring base (fig. 9*c*): Distinguished by relatively narrow jar body above the base. "Makers' marks" are sometimes visible on the base.

B7-6: Medium-high base (fig. 9*f*): Distinguished by relatively large base, narrow stem, and rounded bottom of jar body above.

B8-2: Small cylindrical base (fig. 11*g, h*).

06-1: Fine comb-decorated sherds (fig. 7*e, f*).

07-1: Pot stand (fig. 9*g*): This type is distinguished by band rims and top and bottom rims of equal diameter.

08-1: Hatched-groove-decorated sherds (fig. 11*k*): Rare.

09-1: Pot stand (fig. 13*g*): Rare.

### LATE LARSA AND OLD BABYLONIAN PERIOD

Ceramics of this period are generally straw tempered and buff to light green in color. The shape category of small bowls shows a tremendous amount of variation that is not well understood, even though we have more collections of this period than any others.

There are two complexes within the period. One has the hatch-rim jar (RJ8-2), the shallow groove-rim bowl (RB8-5), and the small cylindrical base (B8-2). The other lacks these items. Whether these two complexes represent style change through time within the period or some other factor is not known.

Sites with dominant surface assemblages of this period are indicated by the occurrence of hatched-groove decorated sherds (08-1).

RJ8-1: Rolled-rim jar (fig. 10*a, b*): Distinguished by a gradual thickening of the slightly curved neck and a rolling over of the lip resulting in a slight crease below the rim. Often hatched-groove decoration (fig. 11*k*) occurs on the vessels with this type of rim.



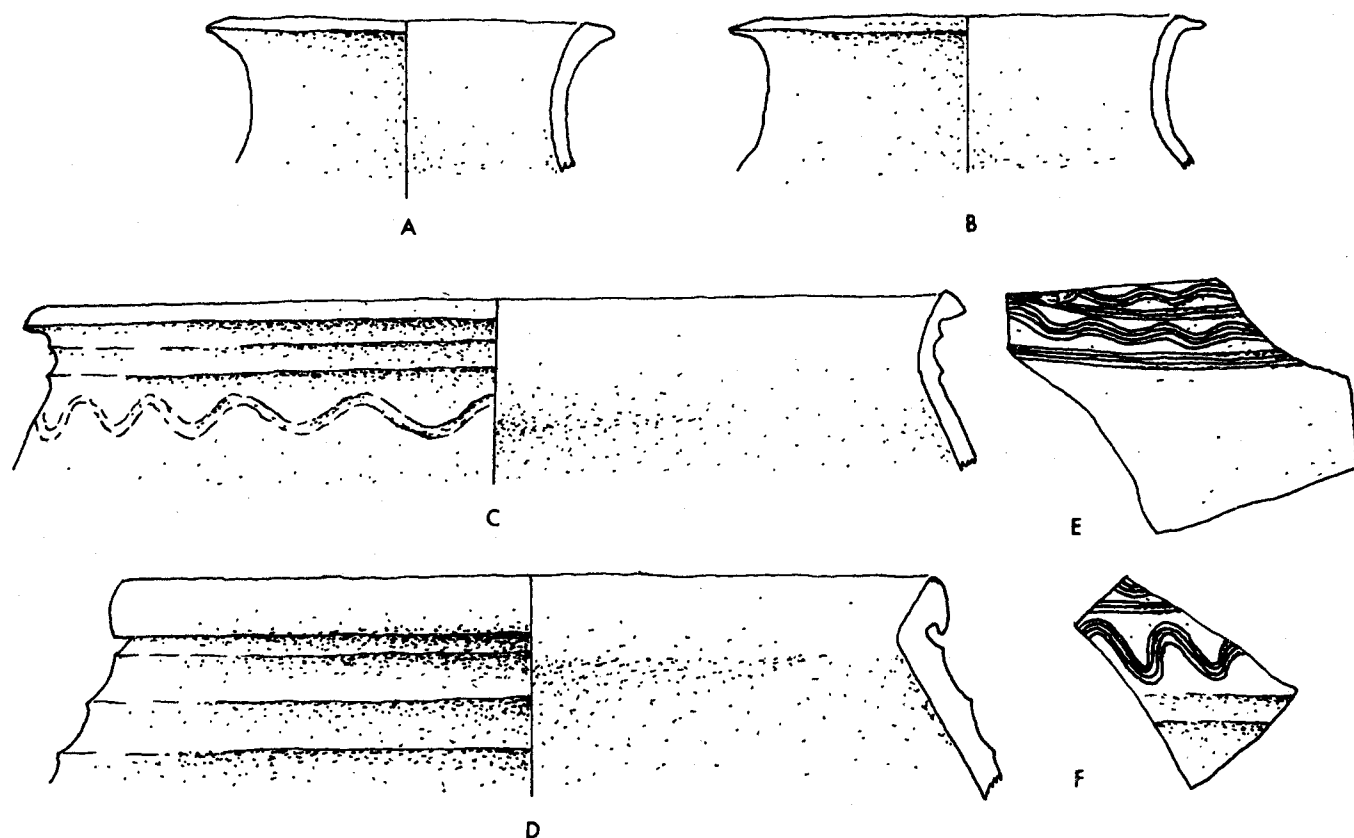


Fig. 7. Ceramics of the Akkadian period (2/5).

- a.* RJ6-1, narrow ledge-rim jar, B: 10YR 7/4, EP-17.
- b.* RJ6-1, narrow ledge-rim jar, B: 10YR 6/4, EP-17.
- c.* RJ6-2, ridged thickened-rim jar, B: 10YR 6/4, EP-12.

- d.* RJ6-3, ridged rounded-band rim jar, B: 10YR 8/5, EP-30.
- e.* O6-1, comb decoration, B: 10YR 6/3, EP-12.
- f.* O6-1, comb decoration, B: 5Y 6/4, EP-12.

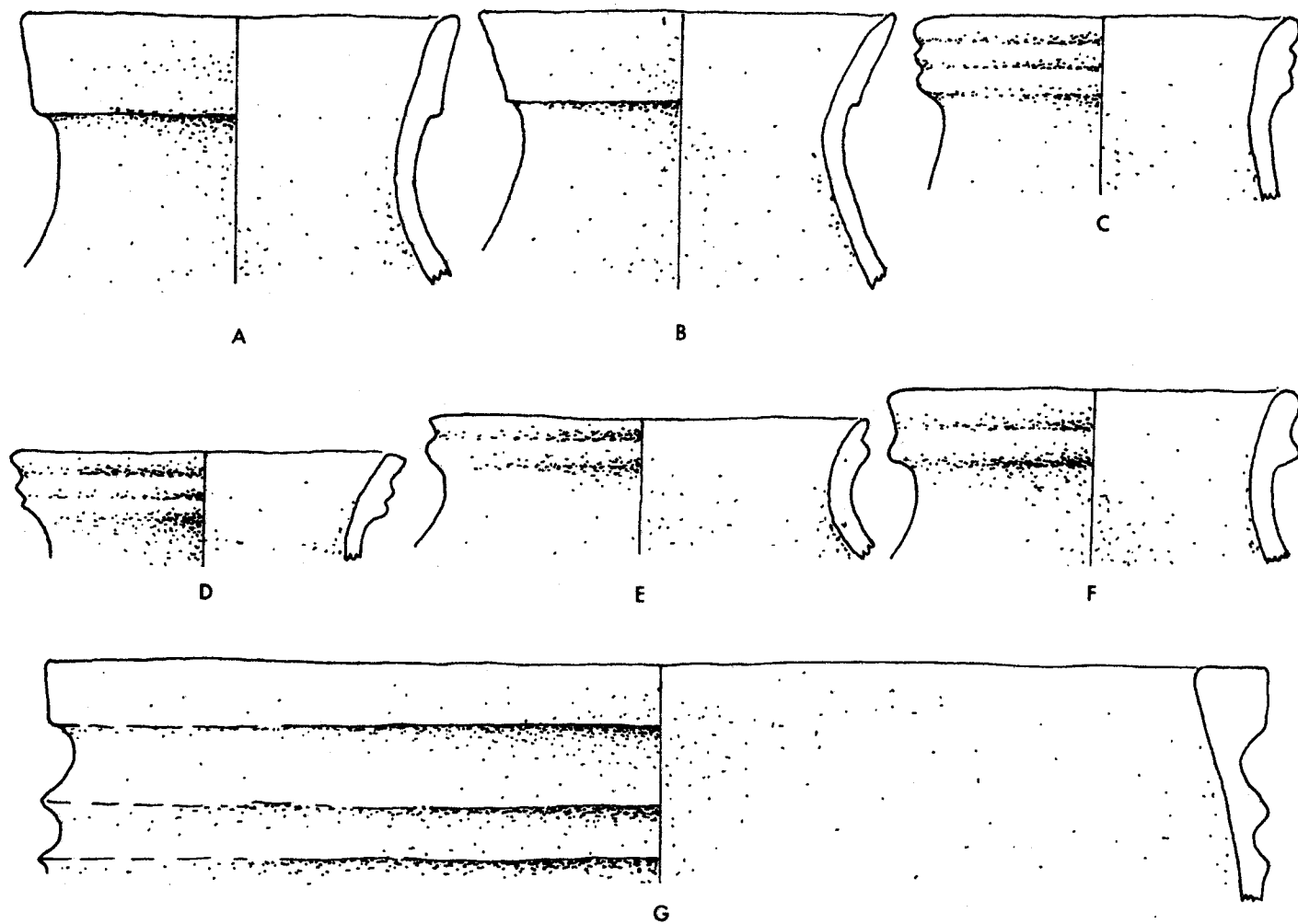


Fig. 8. Ceramics of the Ur III Early Larsa period (2/5).

- a. RJ7-1, high band-rim jar, B: 5Y 6/3, EP-60.
- b. RJ7-1, high band-rim jar, B: 5Y 7/4, EP-30.
- c. RJ7-2, double groove band-rim jar, B: 10YR 6/4, EP-60.
- d. RJ7-2, double groove band-rim jar, B: 5Y 5/4, EP-84.

- e. RJ7-3, single groove band-rim jar, B: 5Y 6/4, EP-60.
- f. RJ7-3, single groove band-rim jar, B: 5Y 6/4, EP-60.
- g. RJ7-4, grooved square-rim jar, B: 5Y 7/3, EP-84.

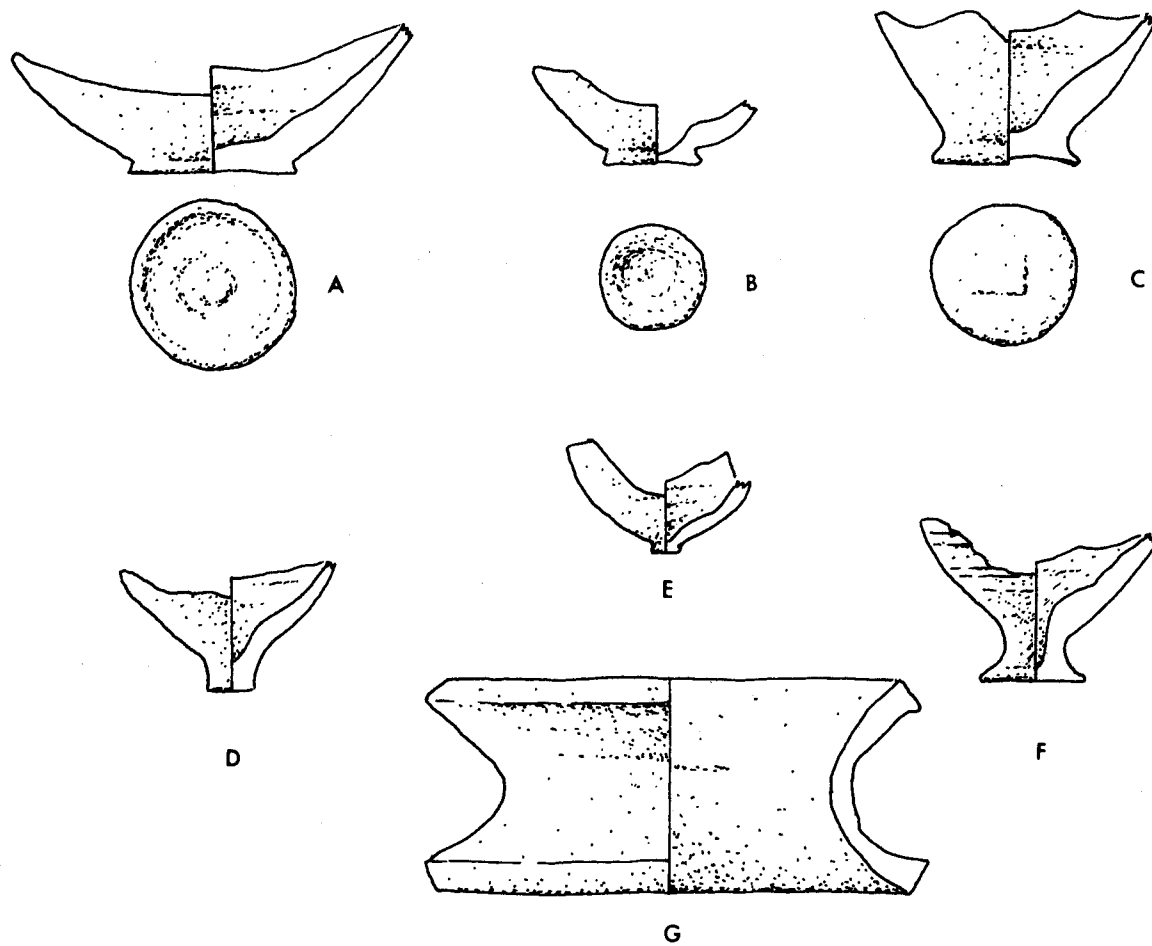


Fig. 9. Ceramics of the Ur III and Early Larsa period (2/5).

- a.* B7-1, disk base, B: 5Y 6/4, EP-84.
- b.* B7-2, large button base, B: 10YR 6/4, EP-29.
- c.* B7-5, ring base, B: 7.5YR 6/6, EP-111.
- d.* B7-3, small conoidal base, B: 5Y 6/3, EP-84.
- e.* B7-4, small button base, B: 10YR 6/5, EP-60.
- f.* B7-6, medium-high base, B: 5Y 6/2, EP-111.
- g.* O7-1, pot stand, B: 5Y 7/3, EP-16.

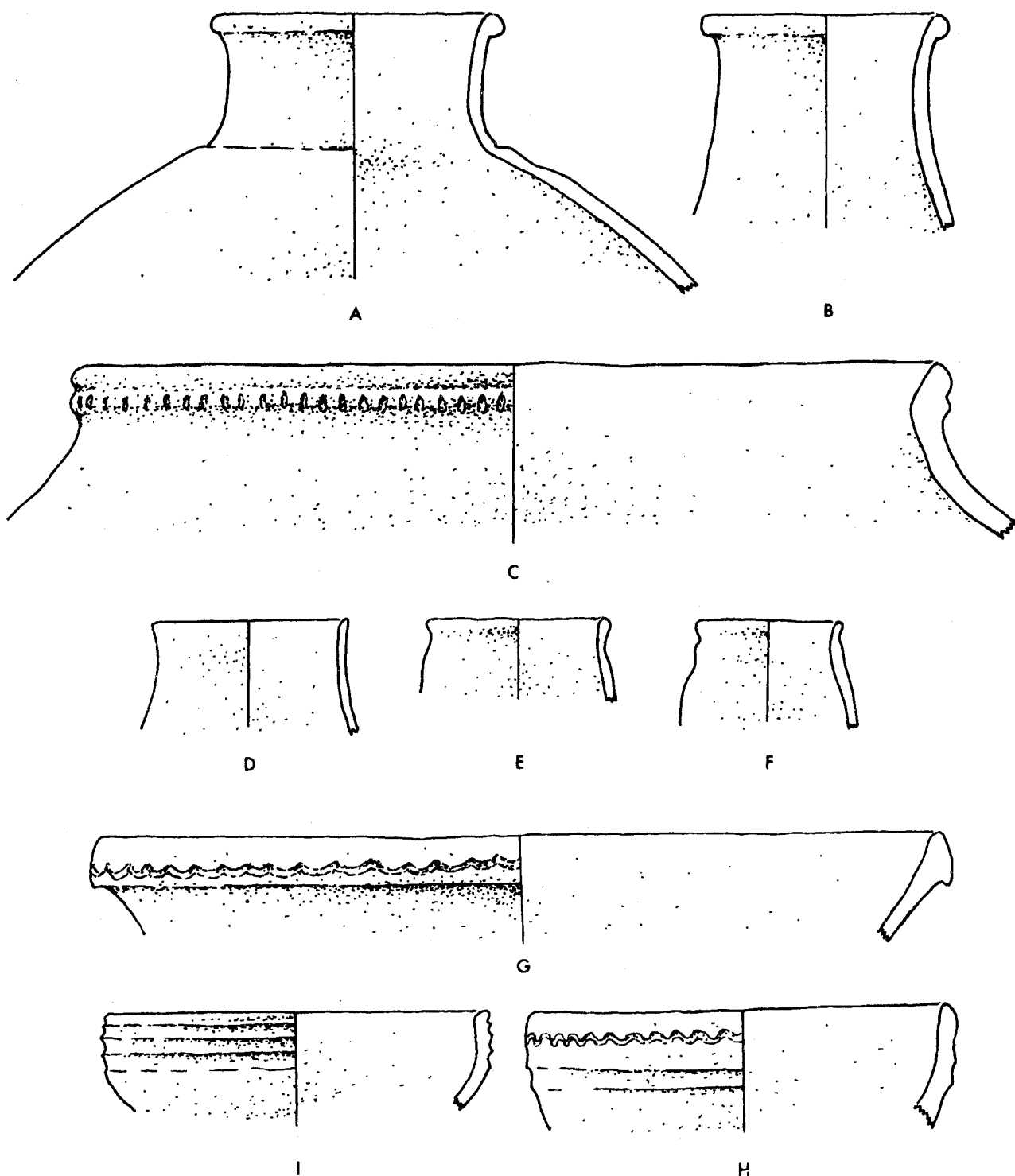


Fig. 10. Ceramics of the Late Larsa and Old Babylonian period (2/5).

- |  |   |
|--|---|
| a. RJ8-1, rolled-rim jar, B: 2.5Y 6/6, EP-34.      | g. RB8-1, band-rim bowl, B: 5Y 6/4, EP-4.                       |
| b. RJ8-1, rolled-rim jar, B: 2.5Y 6/5, EP-34.      | h. RB8-2, multiple-groove simple-rim bowl, B: 2.5Y 7/4, EP-2.   |
| c. RJ8-2, hatched-groove rim jar, B: 5Y 6/4, EP-2. | i. RB8-3, irregular-groove simple-rim bowl, B: 5Y 6/4, EP-133E. |
| d. RJ8-3, thin simple jar rim, B: 10YR 8/4, EP-16. |   |
| e. RJ8-3, thin simple jar rim, B: 2.5Y 8/4, EP-72. |   |
| f. RJ8-3, thin simple jar rim, B: 10YR 7/4, EP-72. |   |

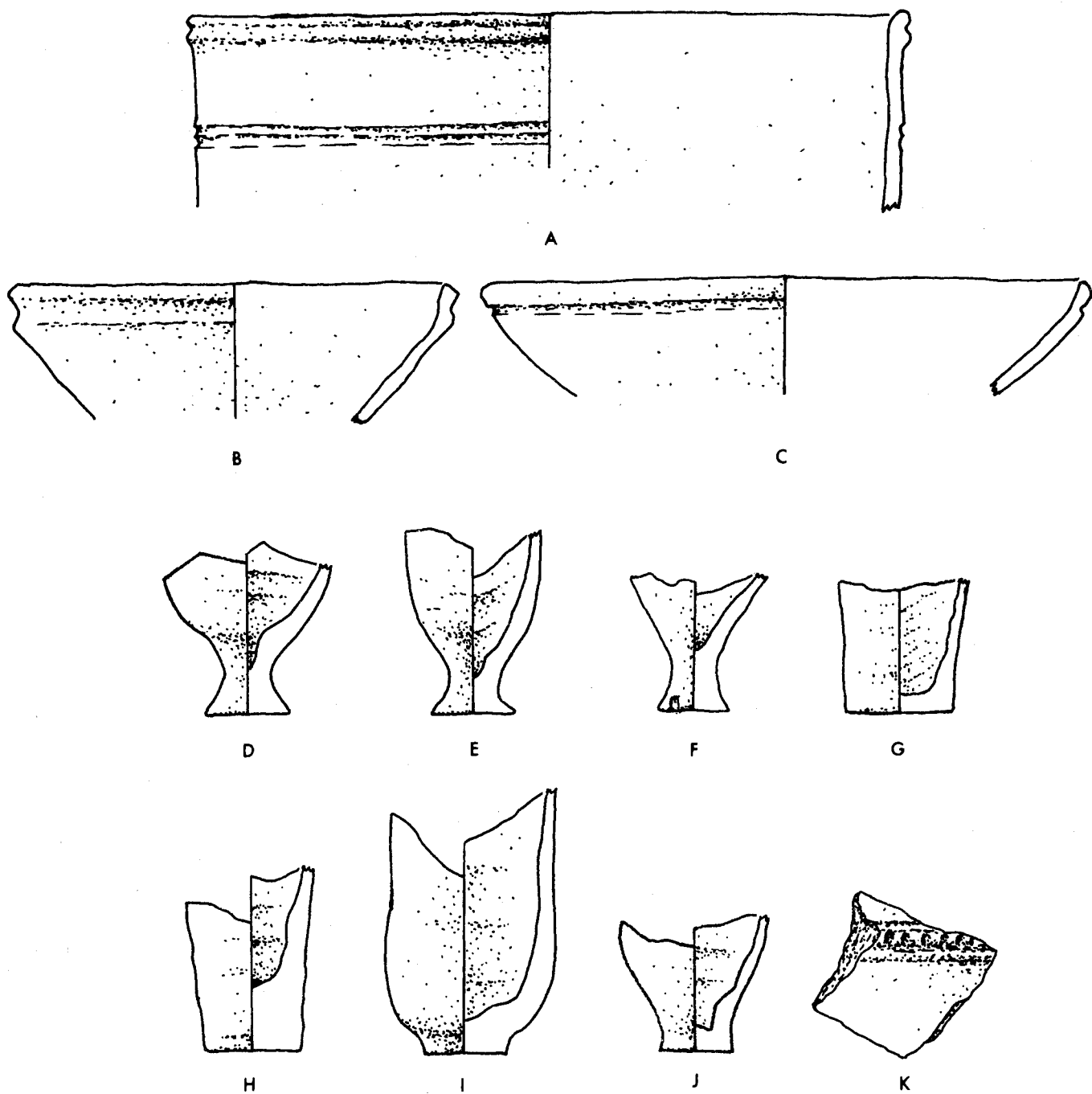


Fig. 11. Ceramics of the Late Larsa and Old Babylonian period (2/5).

- a.* RB8-4, deep multiple-groove-rim bowl, B: 2.5Y 5/4, EP-1.
- b.* RB6-1, fine carinated vertical-rim bowl, B: 5Y 5/3, EP-34.
- c.* RB8-5, shallow single-groove-rim bowl, B: 10YR 7/5, EP-150.
- d.* B8-1, small high base, B: 10YR 5/4, EP-4.
- e.* B8-1, small high base, B: 2.5Y 3/0, EP-4.
- f.* B8-1, small high base, B: 10YR 6/5, EP-72.
- g.* B8-2, small cylindrical base, B: 5Y 6/4, EP-34.
- h.* B8-2, small cylindrical base, B: 10YR 6/4, EP-30.
- i.* B8-3, incurved flat base, B: 5Y 6/6, EP-34.
- j.* B8-3, incurved flat base, B: 2.5Y 6/4, EP-84.
- k.* O8-1, hatched-groove decoration, B: 10YR 7/4, EP-34.

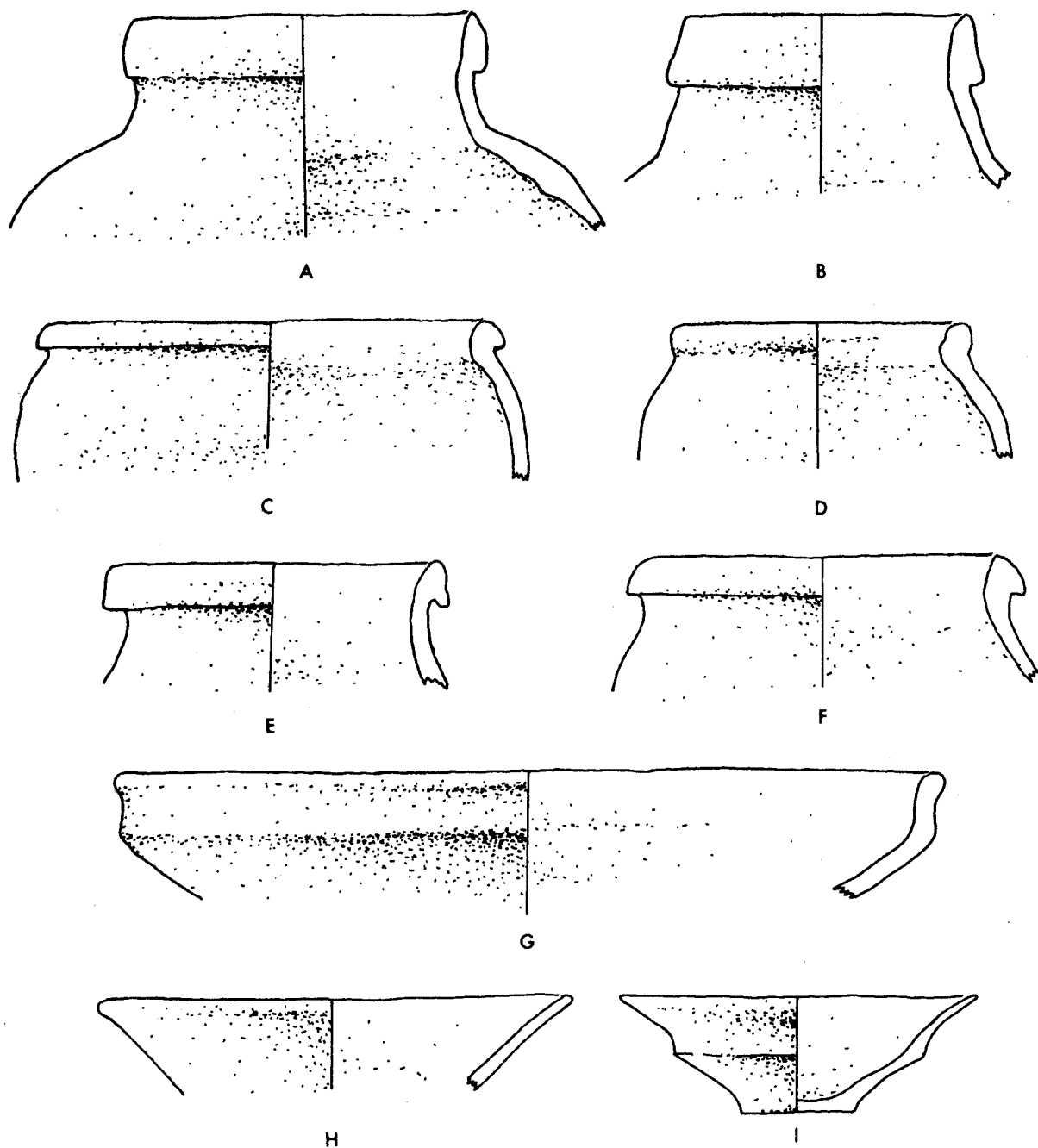


Fig. 12. Ceramics of the Cassite and Post-Cassite periods (2/5).

- a.* RJ9-1, heavy band-rim jar, B: 5Y 6/4, EP-36.
- b.* RJ9-1, heavy band-rim jar, B: 5Y 5/3, EP-89.
- c.* RJ9-2, incurved rolled-rim jar, B: 5Y 5/3, EP-189.
- d.* RJ9-2, incurved rolled-rim jar, B: 5Y 5/4, EP-189.
- e.* RJ9-3, outcurved rolled-over-rim jar, B: 5Y 6/4, EP-189.
- f.* RJ9-3, outcurved rolled-over-rim jar, B: 5Y 7/4, EP-189.
- g.* RB9-1, heavy vertical-rim carinated bowl, B: 5Y 5/3, EP-16.
- h.* RB9-2, shallow conical bowl, B: 5Y 6/4, EP-36.
- i.* RB9-3, shallow carinated bowl, B: 2.5Y 8/4, EP-36.

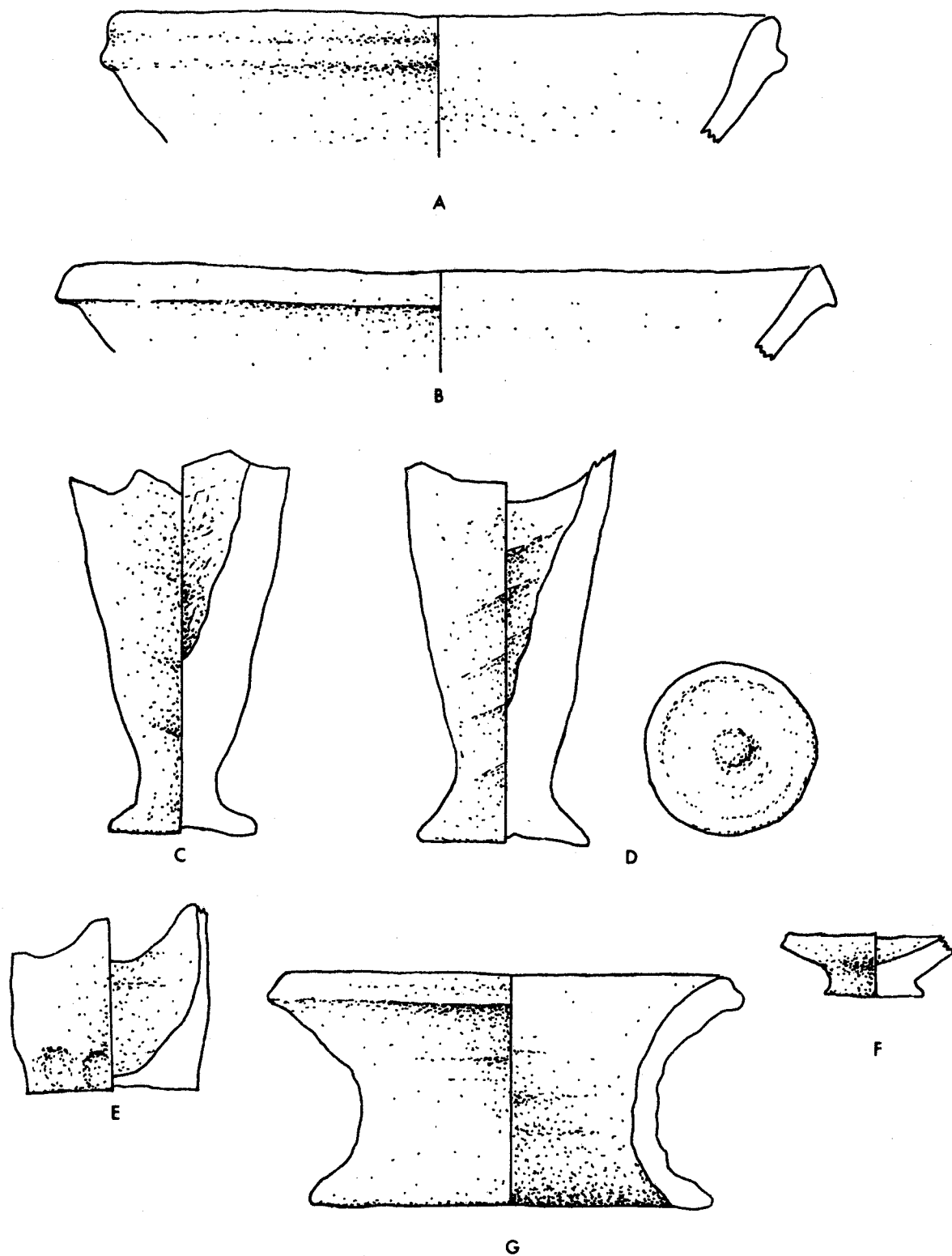


Fig. 13. Ceramics of the Cassite and Post-Cassite periods (2/5).

- a.* RB9-4, heavy ridged-rim bowl, B: 5Y 8/3, EP-189.
- b.* RB9-5, heavy round beveled-rim bowl, B: 5Y 5/4, EP-186.
- c.* B9-1, solid-footed chalice base, B: 5Y 5/4, EP-89.
- d.* B9-1, solid-footed chalice base, B: 5Y 7/2, EP-6.
- e.* B9-2, rough cylindrical base, B: 5Y 5/4, EP-89.
- f.* B9-3, small disk base, B: 5Y 7/3, EP-189.
- g.* O9-1, pot stand, B: 5Y 5/3, EP-89.

## Appendix: The Southern Margins of Sumer

RJ8-2: Hatched-groove-rim jar (fig. 10c): Distinguished by a band rim with either one or two grooves creating two or three ridges respectively. The lower or middle ridge is hatched.

RJ 8-3: thin simple jar rims (fig. 10d-f).

RB6-1: Fine carinated vertical-rim bowl (fig. 11b).

RB8-1: Band-rim bowl (fig. 10g): Distinguished by a rounded band rim on a large, shallow bowl. Often there is an incised wavy line as shown in the illustration.

RB8-2: Multiple-groove simple-rim bowl (fig. 10h): Distinguished by a yellowish body, small hemispherical shape, and up to eight closely spaced grooves on the exterior of the rim.

RB8-3: Irregular-groove simple-rim bowl (fig. 10i): Distinguished by buff to green body, thick walls, and series of thickenings resembling the RB8-2 groovings. Often there is an incised wavy line as shown in the illustration.

RB8-4: Deep multiple-groove-rim bowl (fig. 11a): Distinguished by near-straight sides. Some grooving was done with a stylus held at various angles while the pot was still turning on the wheel, but some seems to have been done with a notched template held against the rotating vessel. The significance of this difference is unknown.

RB8-5: Shallow single-groove-rim bowl (fig. 11c): Distinguished by simple rim with single exterior groove.

B7-1: Disk base (fig. 9a).

B7-3: Small conoid base (fig. 9d).

B8-1: Small high base (fig. 11d-f): Distinguished by small cylindrical base with a high stem and rounded body above. In section, this body is often shaped like the letter U. The body is often yellowish.

B8-2: Small cylindrical base (fig. 11g, h): Distinguished by thick base and marked but regular interior thickenings.

B8-3: Incurved flat base (fig. 11i, j): Distinguished by a cylindrical or slightly constricted body with a rounded bottom that is formed into a small, flat solid base. A similar Neo-Babylonian and Achaemenian type is generally smaller and yellower.

08-1: Hatched-groove decorated sherds (fig. 11k): Distinguished as two to four parallel grooves around a jar neck with hatches across several of the resulting grooves. Only more complex varieties are definitely of this period.

08-2: Sherds with heavy black lines painted in bituminous paint. This also recurs in the Neo-Babylonian and later periods.

### CASSITE AND POST-CASSITE PERIOD

Ceramics of this period are thick and have heavy vegetal temper. They vary from light brown to dark green.

There are two complexes within this period. One has heavy band-rim jars (RJ9-1) and shallow carinated bowls (RB9-3). This is probably a Cassite complex. The other

has incurved rolled-rim jars (RJ9-2), outcurved rolled-rim jars (RJ9-3), heavy ridged-rim bowls (RB9-4), heavy rounded bevel-rim bowls (RB9-5), and a small disk base (B9-3). This is probably a Post-Cassite complex. Often these two complexes occur on the same site.

Sites with dominant surface assemblages of this period are marked by the occurrence of solid-footed chalice bases (B9-1).

RJ7-5: Flattened rolled-over-rim jars: In this period, this category includes small fragments of RJ9-1 on which the distinctive neck characteristics are no longer preserved.

RJ8-1: Rolled-rim jar (fig. 10a, b): In this period, this category includes small fragments of RJ9-2 on which the neck characteristics are no longer visible.

RJ8-3: Thin simple jar rims (fig. 10d-f).

RJ9-1: Heavy band-rim jars (fig. 12a, b). Distinguished by a neck that slopes below the rim to a marked crease, then curves out and down to form the body of the vessel.

RJ9-2: Incurved rolled-rim jars (fig. 12c, d): Distinguished by the lack of a neck, the thickened, slightly rolled rim is formed directly from the incurved upper body of the vessel.

RJ9-3: Outcurved rolled-over jar rim (fig. 12e, f): Distinguished by outcurved neck and lip thickened and rolled over to the point where there is a marked concavity below it.

RB8-1: Band-rim bowl (fig. 10g).

RB8-3: Irregular-groove simple-rim bowl (fig. 10i).

RB8-5: Shallow single-groove rim bowl (fig. 11c).

RB9-1: Heavy vertical-rim carinated bowl (fig. 12g). Distinguished by thickness of body and by slightly rolled-over rim.

RB9-2: Shallow Conical Bowl (fig. 12h). Both large and small forms occur.

RB9-3: Shallow carinated bowl (fig. 12i): Distinguished by marked carination halfway between the rim and the base, generally small.

RB9-4: Heavy ridged-rim bowl (fig. 13a): Distinguished by a thick rim and very thick ridge below the rim. Probably a development of RB9-1.

RB9-5: Heavy round bevel-rim bowl (fig. 13b): Distinguished by a slight lip at the lower edge of the rim.

B7-1: Disk base (fig. 9a).

B7-2: Large button base (fig. 9b).

B7-3: Small conoid base (fig. 9d).

B7-4: Small button base (fig. 9e).

B9-1: Solid-footed chalice base (fig. 13c, d): Note the heavy ridges on the interior.

B9-2: Rough cylindrical base (fig. 13e): Distinguished by large size and irregular finger markings on lower body.

B9-3: Small disk base (fig. 13f): Distinguished by its small size. Some examples are string cut.

09-1: Pot stand (fig. 13g): Distinguished by unequal



diameter of the rims and by the rounded contour of the rims in section.

# NEO-BABYLONIAN, ACHAEMENIAN, AND LATER PERIOD

Ceramics of this period have light to medium vegetal tempering in the larger-sized vessels and a sandy body in the smaller vessels. Colors range from yellowish to greenish. Glaze is frequent on certain types, though it is often weathered to a white encrustation.

Sites with dominant assemblages of this period are marked by Round-rim jar rims (RJ10-1).

Sites on which a majority of round-rim jars (RJ10-1) lack ridges seem to have few model horses (O10-3), stamped sherds (O10-5), and eggshell-ware sherds. This may represent a Neo-Babylonian complex, since sites with this assemblage seem to be on older positions on the canal systems. Unfortunately there are few sites with a clear dominance of this complex.

RJ10-1: round-rim jar rim (fig. 14a, b): Distinguished by vertical or slightly concave thin-walled neck and thickened rim. Often the rounded section of the rim thickening, as shown in the illustration, is slightly flattened on the top and exterior, creating a squared section. Varieties of this type have plain necks, necks with a single sharp ridge, necks with multiple sharp ridges, and necks with hatched ridges. Glaze occurs on some examples.

RJ10-2: Thick-rim jar (fig. 14c): Distinguished by a slight rim thickening and low concave neck, changing smoothly into a convex body, frequently grooved. Perhaps this developed from RJ9-3.

RJ10-3: Club-rim jar (fig. 14d): Distinguished by a vertical or slightly concave thin-walled neck with a small rounded rim separated from the neck by a relatively deep downward groove.

RJ10-4: Large thick-rim jar (fig. 14e): Distinguished by a large, relatively wide mouth and the immediate sloping out from the rim to a rounded body. Grooving or ridging is frequent.

RJ10-5: Concave band-rim jar (fig. 14f): Distinguished by a large, relatively wide mouth, thickened, flattened rim, and deep upward groove on the body isolating a wide concave band.

RB10-1: Simple ledge-rim bowl (fig. 14g): Distinguished by thin walls. On some sites, glaze is preserved on many of these rims.

RB10-2: Narrow ledge-rim carinated bowl (fig. 14h): Same.

RB10-3: Wide ledge-rim carinated bowl (fig. 15a): Same.

RB10-4: Inverted-rim carinated bowl (fig. 15b): Same.

RB10-5: Grooved trapezoidal-rim bowl (fig. 15c): The illustrated example is relatively small and relatively thick walled for this type.

B10-1: Grooved flat base (fig. 15d): Distinguished by scoring on the bottom and grooving on lower body. Frequently glazed.

B10-2: Thin flat base (fig. 15f): Distinguished by thinness, sandy texture of the paste, and slightly convex irregular remnant of clay in the center of the interior.

B10-3: Hole base (fig. 15e): Distinguished by large size of vessel, the hole, and the wide thickened rim around the hole.

B10-4: Small incurved flat base (fig. 16a, b): Distinguished by small size and yellow, sometimes sandy paste clay body.

O10-1: Simple loop handle (fig. 16c).

O10-2: Pinched lug handle (fig. 16d).

O10-3: Model horse (fig. 16e, f): Pinched mane and long modeled tail frequent. Rider is rare.

O10-4: Stamped-node decorated sherds (fig. 16g): Distinguished by fingerprint in the node on the inside and stamp outside, either plain as illustrated, or with a variety of designs.

O10-5: Medallion-stamp decorated sherds (fig. 16i): The wheel-like design is most common.

O10-6: Tripod support legs (fig. 16h).

O10-7: Dentate-stamp decorated sherds (fig. 16j, k): Frequently in vertical or oblique sets between the grooves on jar shoulders.

O10-8: Roughened bottom dishes (fig. 16l); Most common are bottom sherds from this form, which is a shallow oval vessel with thick, heavily chaff tempered walls and bottom. The bottom was roughened with a toothed instrument whose teeth are large and may be round, square, or triangular. This form is distinguished from the Hassuna "husking tray" by the small size of the roughening impressions.

O10-9: Eggshell-ware sherds: Small, very thin sherds with a fine paste, generally very light brown or white and sometimes glazed.

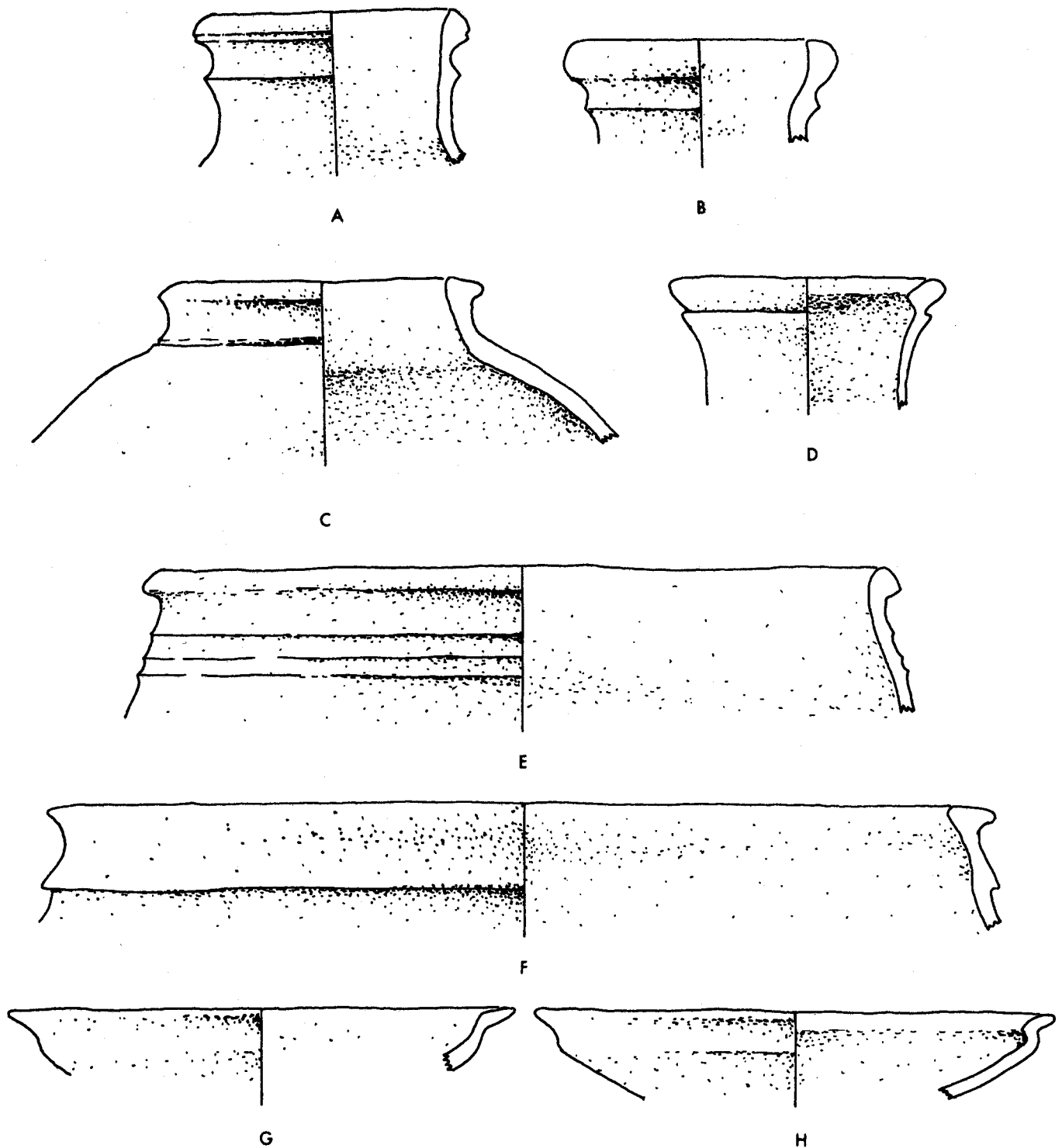


Fig. 14. Ceramics of the Neo-Babylonian and Later period (2/5).

- a.* RJ10-1, round-rim jar, B: 5Y 7/3, EP-50.
- b.* RJ10-1, round-rim jar, B: 5Y 6/4, EP-47.
- c.* RJ10-2, thick-rim jar, B: 5Y 6/4, EP-50.
- d.* RJ10-3, club-rim jar, B: 10YR 7/3, EP-50.
- e.* RJ10-4, large thick-rim jar, B: 10YR 8/4, EP-148.
- f.* RJ10-5, concave band-rim jar, B: 10YR 7/3, EP-88.
- g.* RB10-1, simple ledge-rim bowl, B: 10YR 7/3, EP-29.
- h.* RB10-2, narrow ledge-rim carinated bowl, B: 5Y 6/4, EP-50.

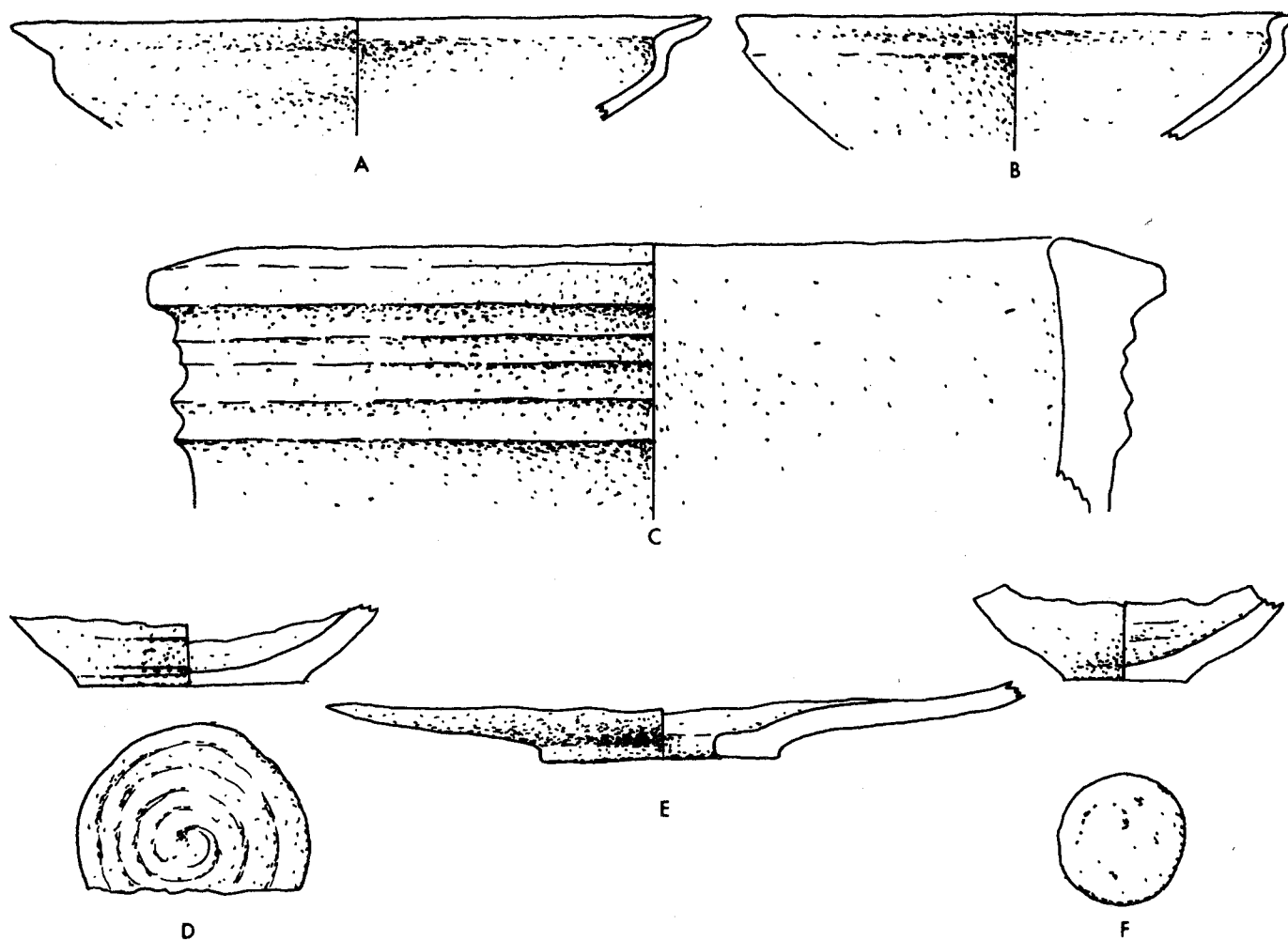


Fig. 15. Ceramics of the Neo-Babylonian and Later period (2/5).

- a.* RB10-3, wide ledge-rim carinated bowl, B: 10YR 7/5, EP-50.
- b.* RB10-4, inverted-rim carinated bowl, B: 5Y 7/3, EP-50.
- c.* RB10-5, grooved trapezoidal-rim bowl, B: 5Y 6/4, EP-102.
- d.* B10-1, grooved flat base, B: 5Y 8/3, EP-50.
- e.* B10-3, hole base, B: 5Y 6/4, EP-81.
- f.* B10-2, thin flat base, B: 2.5Y 8/4, EP-72.

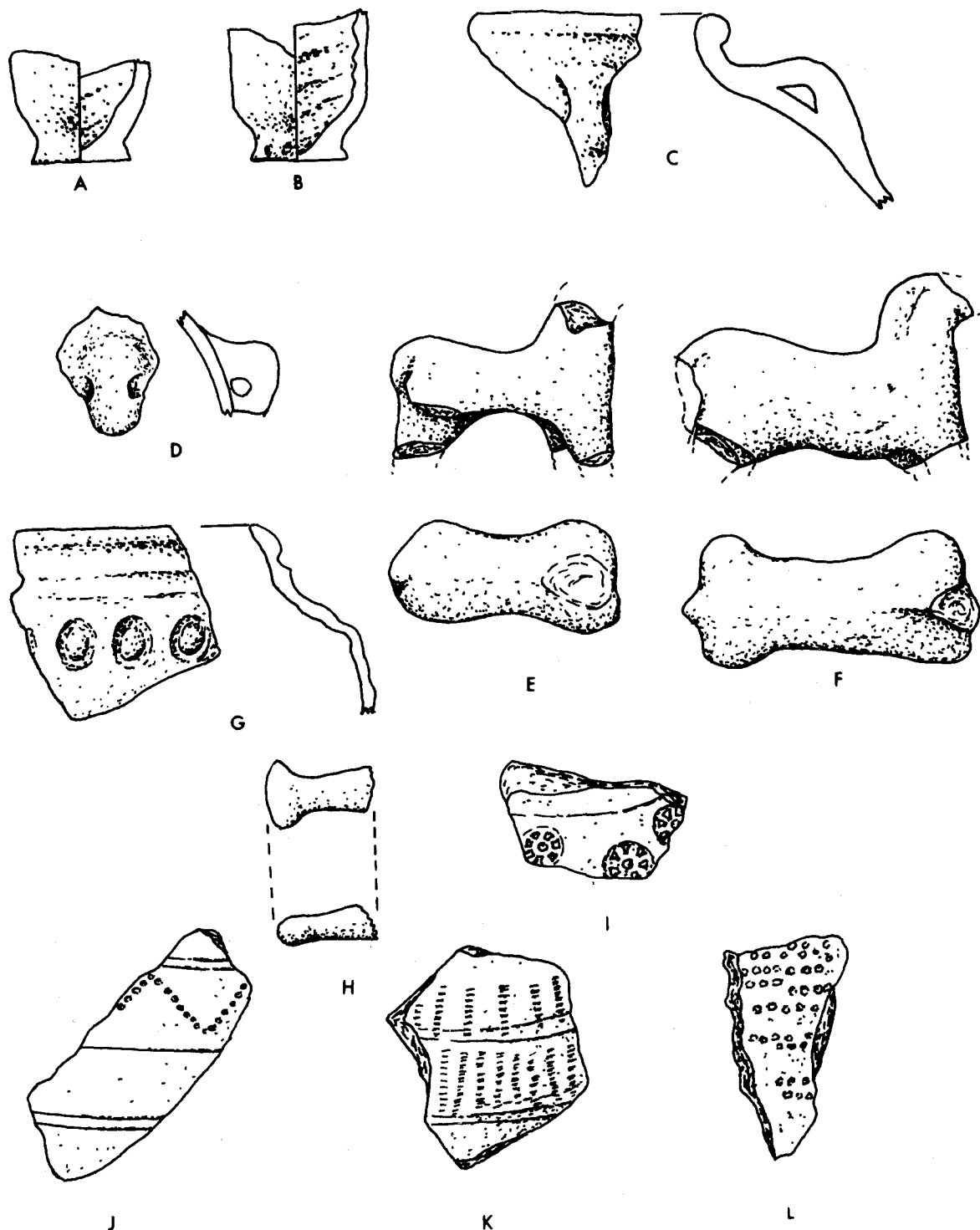


Fig. 16. Ceramics of the Neo-Babylonian and Later period (2/5).

- a.* B10-4, small incurved flat base, B: 10Y 7/4, EP-88.
- b.* B10-4, small incurved flat base, B: 2.5Y 7/4, EP-102.
- c.* O10-1, simple loop handle, B: 5Y 5/3, EP-50.
- d.* O10-2, pinched lug handle, B: 5Y 6/4, EP-162.
- e.* O10-3, model horse, B: 5Y 6/4, EP-50.
- f.* O10-3, model horse, B: 5Y 8/4, EP-162.
- g.* O10-4, stamped-node decoration, B: 10YR 7/5, EP-162.
- h.* O10-6, tripod support leg, B: 5Y 7/3, EP-50.
- i.* O10-5, medallion-stamp decoration, B: 5Y 7/4, EP-110.
- j.* O10-7, dentate decoration, B: 5Y 6/3, EP-48.
- k.* O10-7, dentate decoration, B: 2.5Y 4/2, EP-113.
- l.* O10-8, roughed dish bottom, B: 5Y 7/3, EP-54.

# The Development of Settlement in the Area of Ur and Eridu

Middle Paleolithic bands hunted on the deserts south of the Euphrates alluvium (Wright 1967) and along the watercourses of a then very different Euphrates River (Voute 1957). Doubtless many campsites of both Middle and succeeding Upper Paleolithic groups are buried beneath the recent sediments. However, the relatively continuous record of human endeavor on the alluvium does not begin until well after the end of the last glaciation, during the sixth millennium B.C.

## EARLY VILLAGES AND TOWNS OF SOUTHERN SUMER (THE UBAID PERIODS AND BEFORE)

The earliest known communities in the surveyed area are those of the Eridu period or Ubaid I phase, whose ceramics are related to those of the Samarran communities of the Zagros Piedmont and the Middle Euphrates and Tigris valleys (Oates 1976, pp. 20–22). Whether these represent immigrants or, in contrast, acculturated local communities, they would have been familiar with the patterns of cattle-breeding and small-scale irrigation agriculture pursued in the Samarran villages. On the other hand, the Eridu period peoples also had on hand copious marsh resources. A canoe model and numbers of perforated clay ovoids, perhaps net weights (Lloyd and Safar 1948, p. 118, Pl. III), from Eridu period levels suggest that the marshes were already being utilized in a sophisticated manner. Regrettably, there are no samples available of faunal or floral remains from sites of this phase, and the balance between collecting and farming is unknown.

By the end of the Eridu period there are four known settlements within the survey area. To the south there was Eridu (EP-3) and 'Usaila (EP-104), 7 kilometers to the west; to the north there was Ur (EP-10) and Tell al-'Ubaid (EP-8), 6 kilometers to the west. In no case can the size of an Eridu period settlement be estimated, but at Eridu and Ur diagnostic sherds were found in only one of the several excavations that reached apparently natural deposits, suggesting small communities of only a hectare or so.

Though there is no evidence of the proliferation of communities—the same four sites remain the only ones occupied—by the end of the Hajji Muhammad period or Ubaid II phase, there is settlement growth. At Eridu there is a temple platform in the "Temple Sounding," and debris is evident in the "Hut Sounding" 100 meters to the east (Safar 1950, p. 28). The distance between the

soundings suggests a site area of more than 2 hectares. At this time, nearby EP-104 had not yet reached its maximum size and was probably about hectare. Thus, there is evidence from the Hajji Muhammad period in the Eridu area of some differentiation both within and between settlements.

These sites remain occupied into the succeeding Early Ubaid period or Ubaid III phase, and for the first time some evidence is available on the economic and social life of the period. A faunal sample from Eridu has wild onager, which would have been hunted on the nearby alluvial desert, domesticated cow, and goats, sheep, or gazelle (Flannery and Wright 1967, pp. 61–63). Exposed Early Ubaid strata at nearby EP-104 have concentrations of freshwater mollusks, showing that the river or marsh environment was also used. Plant use is unfortunately not documented.

It is during the Early Ubaid period that the settlement of Eridu grows beyond the limits of the central mound, at least to the southwest, though no actual architecture is known from this area (Campbell-Thompson 1919, p. 136). The temple platform becomes more elaborate, and there is both mud brick and adjacent reed domestic construction in the "Hut Sounding" (Safar 1950, p. 28). The fragmentary evidence does not allow a social characterization of the center. During this period, several new settlements are founded. Perhaps early in the phase, when bowls derived from Hajji Muhammad types are common, the site of Merejib (EP-29) (cf. Woolley 1956, pp. 82–85) is occupied near the channel through the Hazim, 8.5 kilometers southeast of Ur. Also at this time, there was use of a campsite on the great sand dunes that border the Eridu plain on the southwest (EP-38W), approximately 45 kilometers west of Ur, outside our area of intensive survey. The site is only a scatter of sherds and retouch flakes from large chert bifaces. Perhaps during this period people went to the dunes to hunt, to cut *Haloxylon* wood for fuel, or to cultivate grain crops in areas with a high water table. Only thorough survey of the difficulty dune area will tell. Perhaps at a slightly later time during this phase, as indicated by numbers of fine cup sherds, another settlement (EP-141) was founded 8 kilometers northwest of al-'Ubaid. Thus there is expansion of the settled areas both up and down the developing levee system.

During the Late and Terminal Ubaid periods, the area can be characterized in both economic and social terms. Several additional food sources are documented. Boat models from Eridu show that sailing craft have been

## Appendix: The Southern Margins of Sumer

developed; and marine fish are being brought to the temple at Eridu as offerings. In the area of agriculture, one can assume that the herding of cattle continues, and from Eridu there are identified wheat, six-row barley, and dates (Safar, pers. comm.). Thus the elements of farming known from later texts are all present by the end of the fifth millennium B.C. That irrigation canals have reached substantial proportions is indicated by both site location and the distribution of evidences of cultivation. In the first place, in the northern part of the survey region, Ur, al-'Ubaid, and newly occupied site EP-73 are located on the corners of a triangle oriented in such a way that it is unlikely that one channel watered all three of them given the later documented amplitude of channel meanders in the area (fig. 17). One of the smaller sites was probably watered by a small branch canal. In the second place, clay sickles, whose period of maximum use was in Late and Terminal Ubaid times, are found on later sites above Eridu and Ur over belts about 5 kilometers wide. To cultivate fields in such belts would require branch canals 3 to 5 kilometers long. Needless to say,

one would prefer to have air photograph traces and cross sections of such canals, but the indirect evidence of sickle distribution is better than none at all. Such canals are within the abilities of extended kin groups to build and maintain. Although they would create no particular demands for managerial control, they would provide such kin groups with more stable and perhaps more nucleated agricultural resources (Fernea 1970, pp. 77-142).

Whatever the situation in the Early Ubaid period, there is no question that by Late Ubaid times we are dealing with a variety of large and small settlements. The aggregate of the evidence from the various excavations at Eridu indicates that it had grown to about 12 hectares. The earlier mound now forms the nucleus of a broad platform on which was a temple on a raised terrace and some substantial buildings of a residential character (Lloyd and Safar 1948, pp. 119-21, pl. VI; Safar 1950, p. 29, fig. 1). In the surrounding town below were more modest buildings, also probably residential (Campbell-Thompson 1919, p. 136, trench XIV, 3). The Eridu cemetery contained both individuals with substantial brick

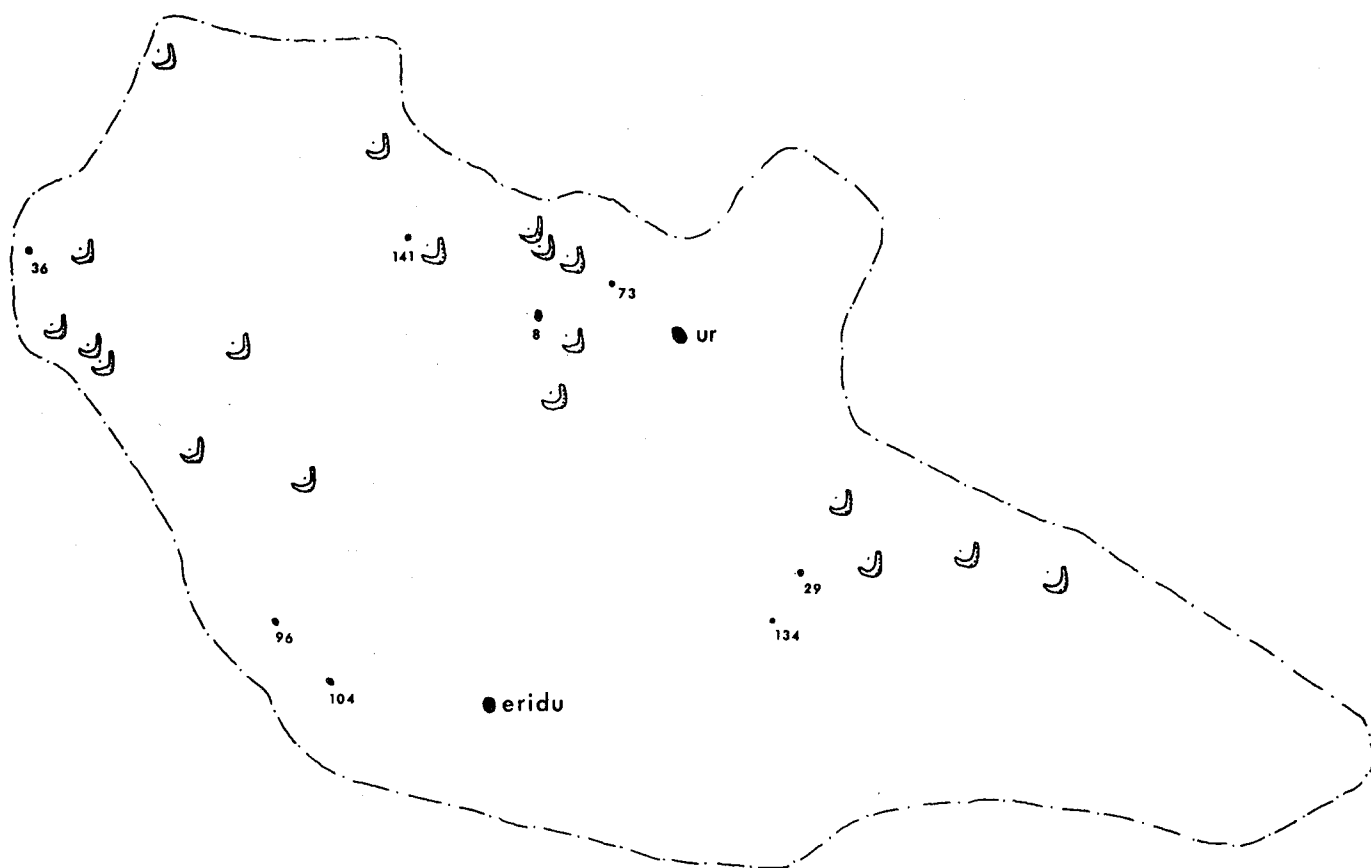


Fig. 17. Settlements of the Late Ubaid period and the distribution of clay sickles found on later sites.

tombs and individuals with none (Lloyd and Safar 1948, pl. IV), but one cannot say what type of social differentiation this represents until the full burial inventory is published. Ur was apparently similar in scale to Eridu, covering about 10 hectares, and it also had modest buildings and a cemetery on its margins (Woolley 1956, pp. 69, 87–102).

Subsidiary to these towns were a variety of smaller settlements. Upstream from Eridu were at least two smaller settlements giving a minimum settlement area for the enclave on the southern most branch of the Euphrates of 17 hectares. Doubtless some other small settlements remain undiscovered. The cultivated zone around these settlements, indicated by stray sickles, was about 100 square kilometers. Upstream from Ur, there is evidence of four small settlements, two of which present interesting surface features. Al-'Ubaid itself is on a low sand knoll covering about 5 hectares. The site has a thin deposit composed mostly of ash lenses. The excavator's opinion that it was a settlement of mud huts is quite reasonable (Hall and Woolley 1927, pp. 149–51). Probably only a portion of the knoll was occupied at any one time. In contrast, site EP-141 is a small, relatively high mound of mud construction debris, perhaps a single building on a platform. Certainly the small subsidiary settlements were not uniform village communities. Assigning an average value of 2.1 hectares to those communities that cannot be measured because of later obscuring deposits, the enclave on the northern branch of the Euphrates covered a minimum area of about 18 hectares. The cultivated zone also would have comprised about 100 square kilometers. Smaller cultivated areas existed to the east around Merejib and to the west around site EP-36 (fig. 17), and the campsite on the dunes continued in use.

It is unlikely that southern Sumer as a whole contained more than 2,500 to 4,000 persons, or about 20 persons per square kilometer of enclave, far fewer than were later supported with a similar technology. Note that this is a revision of the figure of 5,000 proposed earlier (Wright 1969, p. 25), resulting from a reconsideration of the dating evidence and assumption of between 125 and 200 persons per hectare of settlement.

From this modest first apogee of settlement there was, in the succeeding Terminal Ubaid period, a diminution in the number of settlements and the extent of cultivated zones. Outlying Merejib and nearby sites are abandoned, and site EP-141 in the Ur enclave was no longer occupied. Others may also have been abandoned. There is only one new site, EP-98, 10 kilometers northwest of Eridu. This new site forms a triangle with Eridu and site EP-104 such that one of the smaller settlements probably was watered by a branch canal. Though it covers only 1 hectare, this settlement has evidence of the manufacture of both pottery vessels and clay sickles. At Ur, a large area of ceramic manufacturing debris has been exposed on the

site margin, but the central areas have not been excavated. At Eridu, the substantial residences continue on the central platform, and modest structures continue at its foot.

The evidence of the fifth and sixth millennia suggests a long period of gradual growth, but this may well be an illusion created by the small sample of sites combined with our limited understanding of the ceramic sequence. Some early sites may be hidden beneath massive later sites, while others doubtless have been removed by the meandering of river channels. Of those visible, we have comprehensive ceramic samples only from Eridu. When more of the sites have been excavated, I suspect that the major period of town growth will prove to be the beginning of the Early Ubaid period or Ubaid III phase. Before that time there was a range of relatively small settlements. After that time a two-level settlement hierarchy was present in each enclave, the towns of Eridu and Ur being the loci of authorities whose powers are yet unknown.

#### THE FIRST STATES (URUK TO EARLY DYNASTIC)

If the Terminal Ubaid period was one of slight diminution in settlement, the Early Uruk period was one of fundamental change. Early Uruk ceramics are known only from the two towns of Eridu and Ur. Regrettably, the evidence from these two is not comparable. Ur is known primarily from exposures on its south margin, where there is evidence of an area for ceramic manufacture continuing from the previous period (Woolley 1956, p. 66, pl. 73). The various excavations of Eridu have exposed a number of substantial buildings, some decorated with cone mosaic, all on the central platform, which had grown to cover 4 hectares (Taylor 1855, pp. 404–15; Hall 1930, pp. 208–13; Lloyd and Safar 1948, pp. 108–10, fig. 7). Around this must have been an extensive lower town covering perhaps 40 hectares, as indicated by the sherd scatter. An early test excavation visible approximately 700 meters northwest of the ziggurat revealed Early Uruk ceramics and copper fragments. Little else is known about this lower settlement. However, it is clear that while small settlements were abandoned, Eridu had expanded greatly. Such nucleation may imply unsettled conditions. If our estimates of the town sizes are correct, population would have been at most 6,200 to 10,000 in the area.

In the succeeding portion of the Uruk period, Ur continued as a small town, but Eridu was abandoned (fig. 18). The buildings on its acropolis filled with more than 2 meters of windblown sand. Periodically deposited as the sand accumulated were groups of crude bowls and small jars that the excavators variously interpret as graves or as votive caches (Campbell-Thompson 1919, pp. 110–12). Whether the assorted Late Uruk sherds from Eridu also

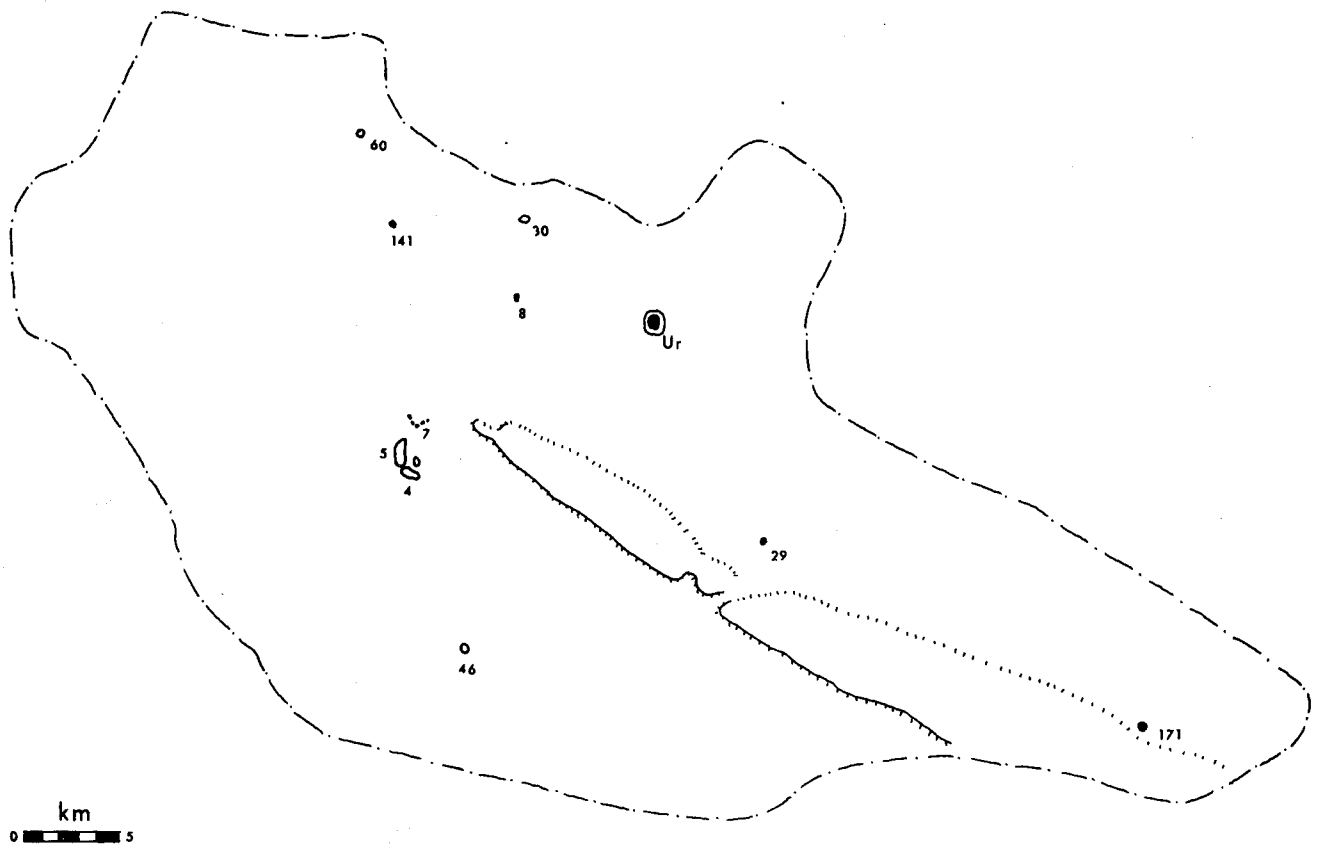


Fig. 18. Settlements of the Late Uruk and Jemdet Nasr periods.

represent such deposits or indicate actual reoccupation cannot be ascertained because of yet later leveling and reconstruction. The encroachment of sand on the central precinct of Eridu may represent a cutting off of the southernmost channel of the Euphrates and desiccation of the Eridu plain. However, one suspects that even with vegetation a great deal of sand would blow into the area from the large dunes to the southwest, and that lack of maintenance alone would lead to an accumulation.

Whatever the situation around Eridu proper, to the north and east the Late Uruk period is one of proliferation of smaller settlements. Ur itself remains a small town of about 10 hectares. The pottery-producing area continues, and no expansion of the town to the south occurs. Southeast along what may have been the southerly course of the Euphrates are a small settlement at Merejib about 12 kilometers away (EP-29), where Woolley found gypsum cement block buildings (Woolley 1956, p. 83), and a center of 3.5 hectares (EP-171) near Tell al-Lahm, about 32 kilometers away. Northwestward, several small settlements are occupied: one at al-'Ubaid itself, only 6 kilometers from Ur, one at site EP-141, 15 kilometers distant,

and perhaps another at site EP-60, 18 kilometers distant. This low density of settlements strung out along the Euphrates contrasts to the dense network of settlements around Late Uruk Warka to the northwest. More interesting than this linear pattern is a small settlement about 12 kilometers southwest of Ur and 12 kilometers north of Eridu, just inside the limits of the Eridu depression at the point where the Hazim dips under the alluvium (EU-7). It consists of six small mounds of debris, most with concentrations of ceramic slag, three aligned north-northwest to south-southeast and three aligned at a near right angle to this, extending east-northeast (Fig. 26). Apparently this site was a series of structures and kilns at the juncture of a canal and one of its branches. The slopes of the land seems such that this canal would flow from the north-northwest and would have left the Euphrates near or above site EP-141, about 10 kilometers away. It continued an unknown distance in the direction of Eridu, but there is no substantial settlement farther on unless it is at Eridu itself. This canal, founded during the Late Uruk period and developed during the Jemdet Nasr period, may well have been excavated to provide access and sustenance



to the shrine at Eridu. It is notable that this is the only canal that follows the course from Uruk to Eridu discussed by Jacobsen (1960, pp. 180–83) on the basis of later ritual texts. Cultivated area on the Eridu plain cannot be estimated, but along the Ur channel about 200 square kilometers would have been available to a population of about 2,500 to 4,000, giving a maximum of 20 persons per square kilometer during Late Uruk times.

Recognizing sites of the Jemdet Nasr period is difficult not simply because of the covering of silt and later occupational layers that plague all efforts at the geographical study of ancient Mesopotamia, but also because of the poor understanding of its nondescript ceramics (Adams and Nissen 1972, pp. 99–103). However, while some smaller Jemdet Nasr sites may be unrecognized, the larger sites can be discussed (fig. 18). Ur itself has grown, the former ceramic producing area being overridden by domestic buildings. Presuming similar expansion in other directions, 15 hectares may have been occupied. A cemetery was on its south edge. The central precinct, later to be the site of the ziggurat and the temple of Nanna, had buildings with cone mosaic decoration (Woolley 1939, pp. 1–6, pl. 11). Up the Euphrates channel 18 kilometers to the northwest lies Ishan Khaiber (EP-60), a small center of 3.5 hectares with evidence of a cone-decorated building and pottery kilns. Intermediate Sakheri Kabir (EP-30), only 8 kilometers from Ur, may have been founded in this period, but the evidence is uncertain. The previously discussed Late Uruk canal waters the town of Rejibah (EP-4, 5, and 93), 13 kilometers southwest of Ur and covering about 23 hectares. Buildings with cone decoration and pottery kilns are indicated here. If the journey of Inanna discussed by Jacobsen refers to this canal, Rejibah might be one of the places mentioned (Jacobsen 1960, pp. 180–83). This canal would have continued southward to the northern suburbs of Eridu (EP-46), for here, beneath the Early Dynastic palaces cleaned by Safar, are possible Jemdet Nasr sherds and clay cone occurrences. This mound covers about 7.5 hectares. In contrast to the larger centers with public buildings is a small unnamed site (EP-156) 11 kilometers northwest of Rejibah and 12 kilometers southwest of Ishan Khaiber. Although wall cones are absent, there are many stone vessel fragments and some metal artifacts suggesting that this 0.6 hectare settlement contained individuals of higher status or wealth. The alignment of the site suggests that water came to it by a canal from the main Euphrates channel to the north. Perhaps this was an isolated elite residence. Another possible Jemdet Nasr site is EP-142, equidistant from Sakheri Kabir and Ishan Khaiber, though it may be of Early Dynastic I age. These, however, are the only recognized exceptions to the pattern of larger settlements during this period. The aggregate of 53 hectares of settlement suggests a regional population of no more than 6,600 to 10,500. Unfortunately, the absence of a network of small sites pre-

cludes any estimation of the area used for cultivation, and therefore a population density estimate cannot be made.

The succeeding Early Dynastic I period has been the focus of a previous lengthy study (Wright 1969), and only a brief summary is necessary to this consideration of the long-term changes in settlement. During this period there is no evidence of occupation on the plain of Eridu, but the Ur area prospered (fig. 19). Ur itself expanded farther to the south, and if similar growth occurred elsewhere around its margins it covered about 21 hectares. The central precinct was replanned on a larger scale. Small, densely packed residences are known, and there may have been larger residences and administrative buildings from which came the many clay sealings and tablet fragments found dumped over the south revetment of the town. Sakheri Kabir (EP-30), 8 kilometers up the Euphrates channel, was a smaller town covering about 8 hectares. Between Ur and site EP-30 were three small villages ranging from 0.4 to 1.5 hectares. Test excavations on the largest of these, Sakheri Sughir (EP-47), indicated that it was a large community of structures dispersed along a canal bank, not unlike the villages of the area today. There was evidence of grain cultivation, the herding of sheep and cows, fishing, and some ceramic production. Near these villages at the abandoned village of Tell al-'Ubad (EP-8) there was a cemetery and an oval structure—perhaps a shrine and rural administrative center. Two short canals 2 to 4 kilometers long are in evidence near these settlements, and doubtless others existed that are now covered by silt. Farther down the Euphrates channels and on side canals below Ur there were at least two more small rural settlements. The cultivated enclave around Ur probably totaled 90 square kilometers, and the settled population no more than 6,000, suggesting no more than 66 persons per square kilometer of possibly cultivated land.

During the later portion of the Early Dynastic period, or Early Dynastic III, there is a reorganization in the pattern of settlement. Ur itself certainly grows. Areas of domestic housing disappear from their former locations, and large buildings of various uses replace them. The rebuilt central precinct, the royal cemetery, and various cuneiform documents attest to the accomplishments of Ur's dynasty. It is possible that Ur approached its full extent of 50 hectares at this time. Sakheri Kabir remains occupied, and the rural shrine at al-'Ubad is rebuilt, but the nearby villages show no trace of occupation. Rural settlement survives only on the channels or canals below Ur. Site EP 175–76, 9 kilometers distant and covering 3.5 hectares, may be of this period. Within the Eridu plain there are new developments. First the north mound at Eridu (EP-46) becomes the site of two palaces, though there is little other evidence of occupation (Safar 1950, pp. 31–33). Various repairs on the main temple platform may date to the same time. Second, at the breach in the Hazim, a tiny site

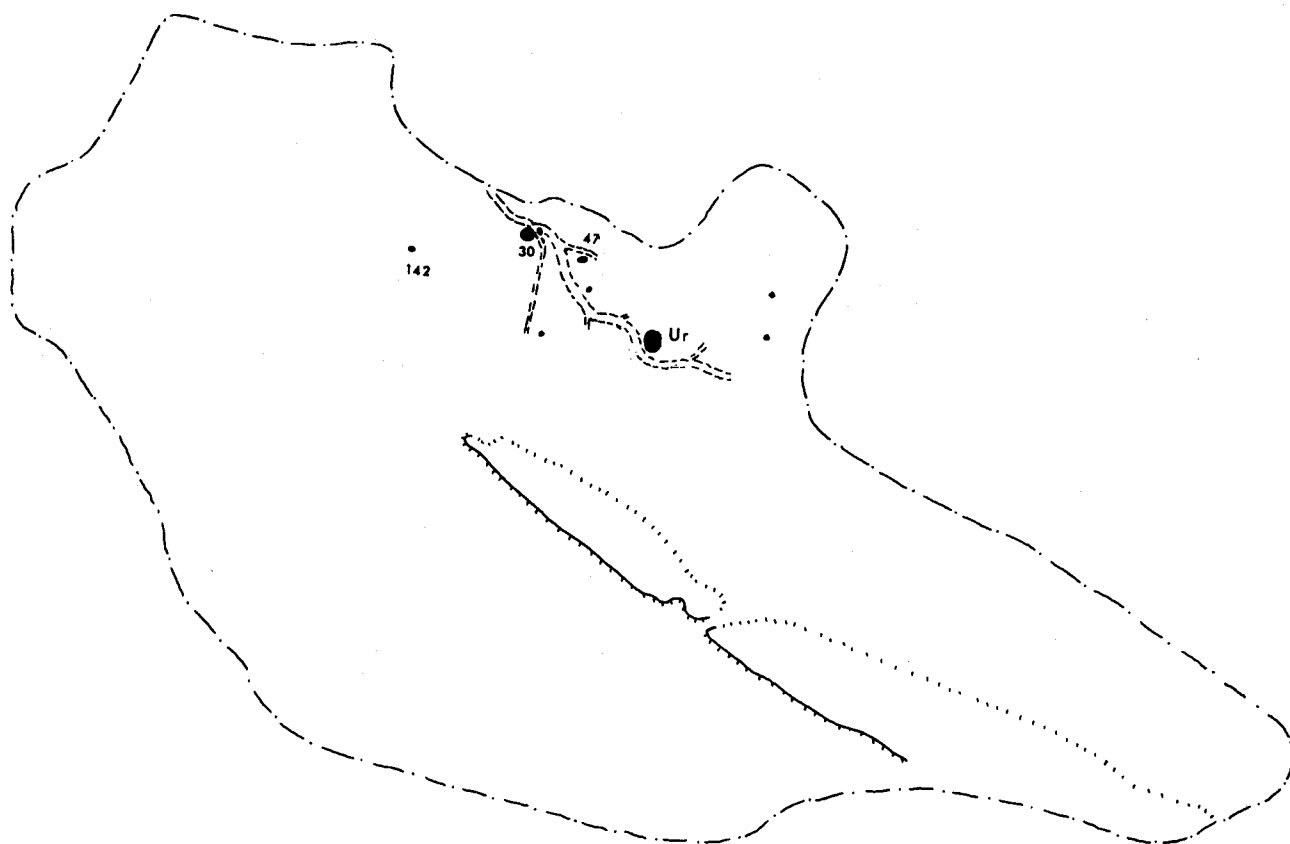


Fig. 19. Settlements of the Early Dynastic I period.

(EP-134) is reoccupied, and several buildings with foundations of baked planoconvex brick are erected along the channel's bank. These sites, the sporadic occurrence of Early Dynastic artifacts on predominantly later sites (EP-31 and EP-96), and textual mention of administrators of Eridu as sending goods to Ur (Burrows 1935, suppl. 16, 44) indicate that water was once again flowing in the southernmost channel of the Euphrates. Whether this was a planned alteration of the channel or not, the palace construction suggests that the opportunity to expand field area was seized by the authorities at Ur.

#### THE FIRST EMPIRES (AKKADIAN TO POST-CASSITE)

Ur's period of independence and prosperity was brief; toward the end of the Early Dynastic period the town was under the control first of the dynasty of Lagash, then that of Uruk (Gadd and LeGrain 1928, p. 3). It then passed under the dynasty of Agade, a footnote to Sargon's conquest of Uruk. The polity of Sargon and his successors was apparently the first to rule not only all of alluvial Mesopo-

tamia, but—at various times—the Susiana, Assyria, and parts of Syria through the agency of appointed governors and military garrisons. It controlled most of the resources used in its crafts and trades; it ruled most of southwest Asia's urban agglomerations; and it made a claim of universal suzerainty that would be repeated by would-be state-builders for centuries: "King of the Four Quarters" (Bottéro, Cassin, and Vercoutter 1965, 109), a claim of suzerainty over peoples speaking diverse languages and following diverse cults. Thus, in the economic, political, and ideological senses, we may speak of the Akkadian polity as an empire, even though it was plagued with rebellion and of only short duration.

It is doubtful that the Akkadian rulers found it difficult to control the region of Ur and Eridu, for there were few towns and settlements on this southern desert border of their domain. The southernmost or Eridu channel had no settlements with what we have termed Akkadian ceramics, and it was perhaps dry. Ur itself was inhabited, as was its northern suburb of Diqdiquah (EP-12), but almost no architecture of the period has been excavated (Woolley 1956, p. 50), and even an approximate estimate of its size

## Appendix: The Southern Margins of Sumer

is difficult. Sakheri Kabir (EP-30), upstream from Ur, apparently shrank to a village-sized settlement of only 2.0 hectares. A new village-sized settlement was inhabited only 4 kilometers northeast of Ur (EP-17). The only other certain Akkadian foundation is 26 kilometers northeast of Ur, apparently on the outer sweep of a large meander in the Euphrates channel (EP-122E). This tiny village, little more than a hectare in area, was to become important in the following centuries.

During the Akkadian period, Ur seems to have become even more nucleated and isolated than it had been during the Early Dynastic period. It seems surprising that it rose so quickly to imperial control. Ur's ascendancy will remain unexplained until more is known about the actual social and economic effect of the Gutian invasions and about the local problems faced at this time by such competing cities as Uruk and Lagash. Although Lagash has cuneiform sources richer than those at any contemporary Mesopotamian site (cf. Genoulliac 1910), its hinterland has never been systematically surveyed; while Uruk's hinterland has been completely surveyed (Adams and Nissen 1972), there is little textual or architectural

evidence of the Akkadian period from the city itself.

At the end of the twenty-second century B.C., the Third Dynasty of Ur, more stable than that of Agade though of shorter duration, gained control of the lowlands of Greater Mesopotamia. The utility of the southern Sumer survey in further elucidating this copiously documented hegemony is limited by four factors. (1) Our ceramic indicators may not have become widespread until well after the founding of the dynasty and certainly continued in use after its demise. (2) Ur, though the seat of the dynasty, was not conveniently situated for administration, and many imperial functions were discharged from more central facilities near Nippur, Lagash, and other towns. (3) The agricultural regime reestablished by the Ur III rulers was so successful that the intensive cultivation of the succeeding period has obscured not only the smaller canal traces, but the main channels of the late third millennium B.C. For this reason they are symbolized only by dotted lines on figure 20. (4) The extensive excavations at Ur have produced few texts relevant to rural life.

The monumental buildings of Ur itself are well known, but little ordinary housing is exposed (Woolley 1974).

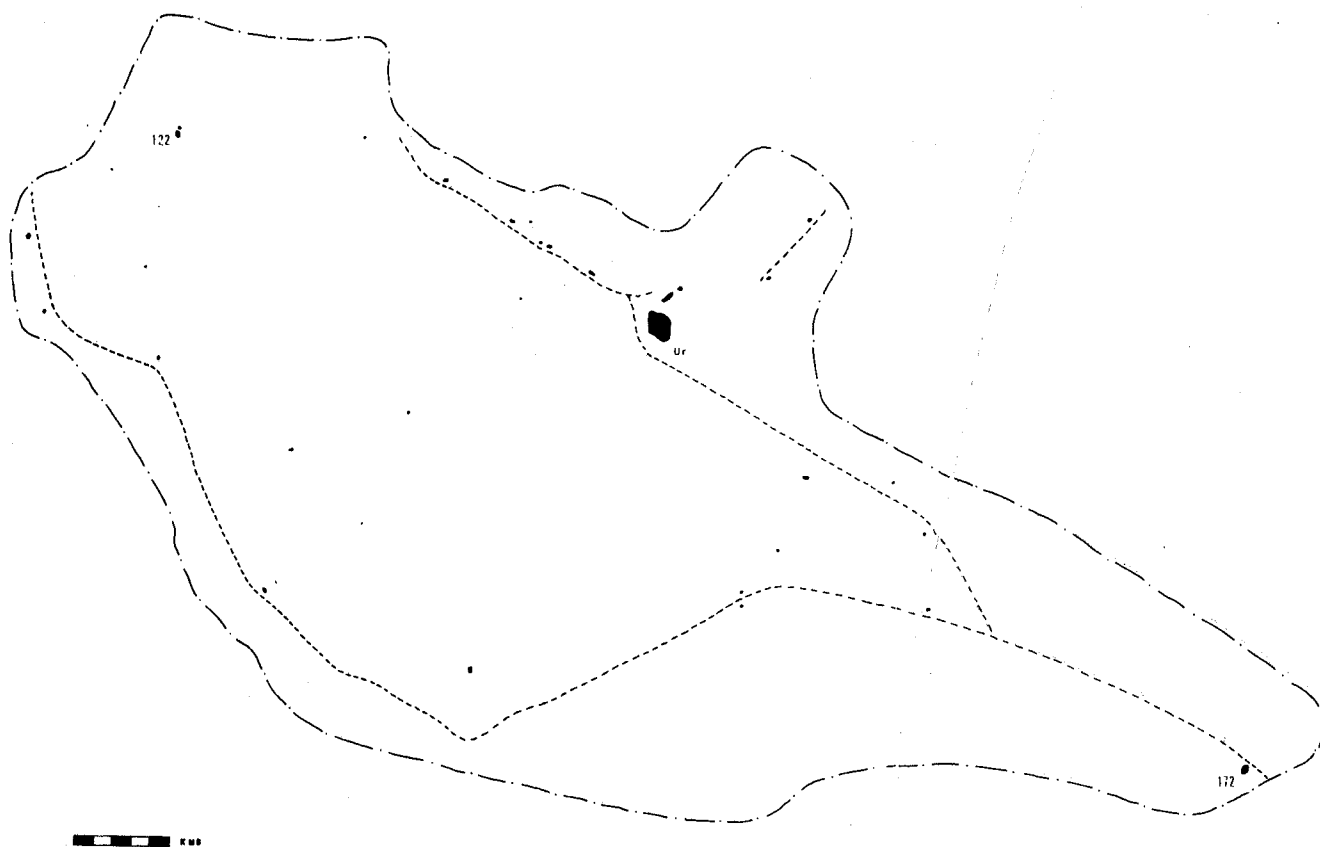


Fig. 20. Settlements of the Ur III and Early Larsa period.

## Appendix: The Southern Margins of Sumer

The Third Dynasty walls enclose about 50 hectares of settled area, a small area compared with other sites to the north and northwest. Of the other twenty-two settlements occupied during the period, only the temple-ziggurat of Eridu has been cursorily examined, and we must rely on surface evidence. In contrast to Ur itself, there are two small centers of about 8 hectares. One is Tell al-Lahm (EP-172), perhaps occupied during the Early Dynastic period and certainly extensive by the early Larsa period, 39 kilometers to the east-southeast of Ur (Safar 1950), which may be ancient Kisiga (Jacobson 1960, pl. 28). The other is the site founded in Akkadian times (EP-122), which reached its maximum size in Ur III–Early Larsa times. The other settlements are small and large villages. Those near Ur itself are strung along the main channel an average of 4 kilometers apart, except for a vacant area southeast of Ur, perhaps the fields and gardens of the city. Those on the now reopened southernmost or Eridu channel average 8 kilometers apart, perhaps an index of the then recent redevelopment of this part of the survey area (fig. 20).

The total of site area occupied throughout this period is about 107 hectares. Slightly less than half of this is the capital itself, with almost all the remainder being in small rural settlements (fig. 25). This suggests a doubling of population over that of the preceding centuries of the third millennium, to at most 13,400 to 21,400. It is perhaps an index of the prosperity of the period that 60 percent of the ten sites whose last major occupation was in this period had baked brick fragments on their surfaces.

During the Late Larsa and Old Babylonian periods the apogee of settlement in southern Sumer was reached. Though Ur had lost its autonomy during the struggles between successor states reaching for control of the richest parts of the empire, its environs became even more heavily populated and productive. Ur grew, its houses spreading beyond the Third Dynasty walls, though certainly not covering the full 500 hectares suggested by Woolley (1965, p. 193); a minimum size for this period would be 60 hectares. Many public buildings were maintained and rebuilt, and extensive areas of dense multistory housing have been excavated. A large number of cuneiform documents attest to the economic and political life of the city (Figulla and Martin 1953). Integrated reanalysis of these data from Ur and the archaeological survey data could solve a number of problems.

The remaining fifty-seven recorded settlements with the ceramics termed Late Larsa–Old Babylonian are, with one exception to be discussed further below, relatively small. Thus, the general size distribution established in the preceding period is duplicated (fig. 25) even though few of the earlier sites continued, 89 percent of the Late Larsa–Old Babylonian sites having no Ur III–Early Larsa occupation. There are six small centers of 5 to 10 hectares. One of these (EP-77) is on the Ur channel, situated only 10

kilometers upstream from Ur (fig. 21). On the Eridu channel, however, there is a continuous distribution of such small centers. Tell al-Lahm (EP-172) is at the easternmost limit of the survey area. Abu Ras'ain (EP-27) is 18 kilometers upstream. Eridu South (EP-108), Safar (1950, p. 28), 3 kilometers southwest of the ancient town, is about 23 kilometers farther. On the west edge of the survey area are the two smallest sites of this size grouping, one (EP-31S) 26 kilometers farther up the channel, and the other (EP-158) 38 kilometers up the channel from Eridu South. Most of these are on the north or left bank, away from the dunes and the Southern Desert beyond, as if this quarter was unsafe. It is in this period that the first definite example of a small rectangular fort with corner bastions is known (EP-166), on the left bank of the Eridu channel (fig. 26). Across the river to the southwest rise the great dunes. To explain this aspect of settlement configuration in terms of a nomad "threat" almost a millennium before the camel gave peoples desert fast mobility is reasonable, since there is a continuous distribution of wells from the area just behind the dunes northeastward toward better-watered areas along the middle Euphrates. Furthermore, even in the third millennium there were nomads in the area, since, from Ur, there is a Late Early Dynastic receipt for lard from Amorites (Burrows 1935, suppl. 29). Smaller than the centers are a range of regularly spaced small and large villages. Around Ur, settlements average only 2 kilometers apart, but those along the Eridu channel occur, on the average, every 5 kilometers. Similar settlements are also spaced evenly throughout the area between the two channels in the northwest end of the survey area; given the slope of the land, it is reasonable to reconstruct a canal in this area, as is shown with dotted lines on figure 21.

The exceptionally large site mentioned above is an unnamed town site on the west edge of the survey area (EP-34). Since it is low and does not appear clearly on the air photographs, it is difficult to measure; however, it covers more than 45 hectares. On the ground, wind erosion has emphasized small canals within the settlement, drains lined with baked brick in former streets, building foundations of both baked and mud brick, and localized concentrations of basalt, copper, ceramic slag, and other items perhaps indicating workshops. Regrettably, no inscribed pieces were found, and we have no idea of the ancient name of this short-lived but substantial town. The ceramics from the site seem to have somewhat finer decoration and appendages than those on other sites of the period, and it is possible that the site represents a late occupation during the Old Babylonian period proper. Certainly this was a period in which there was ample excuse for resettling populations in new areas. If this site is later, perhaps some of the small settlements contributing to the marked density of sites near EP-34 are of the later part of the period as well. Unfortunately there are other

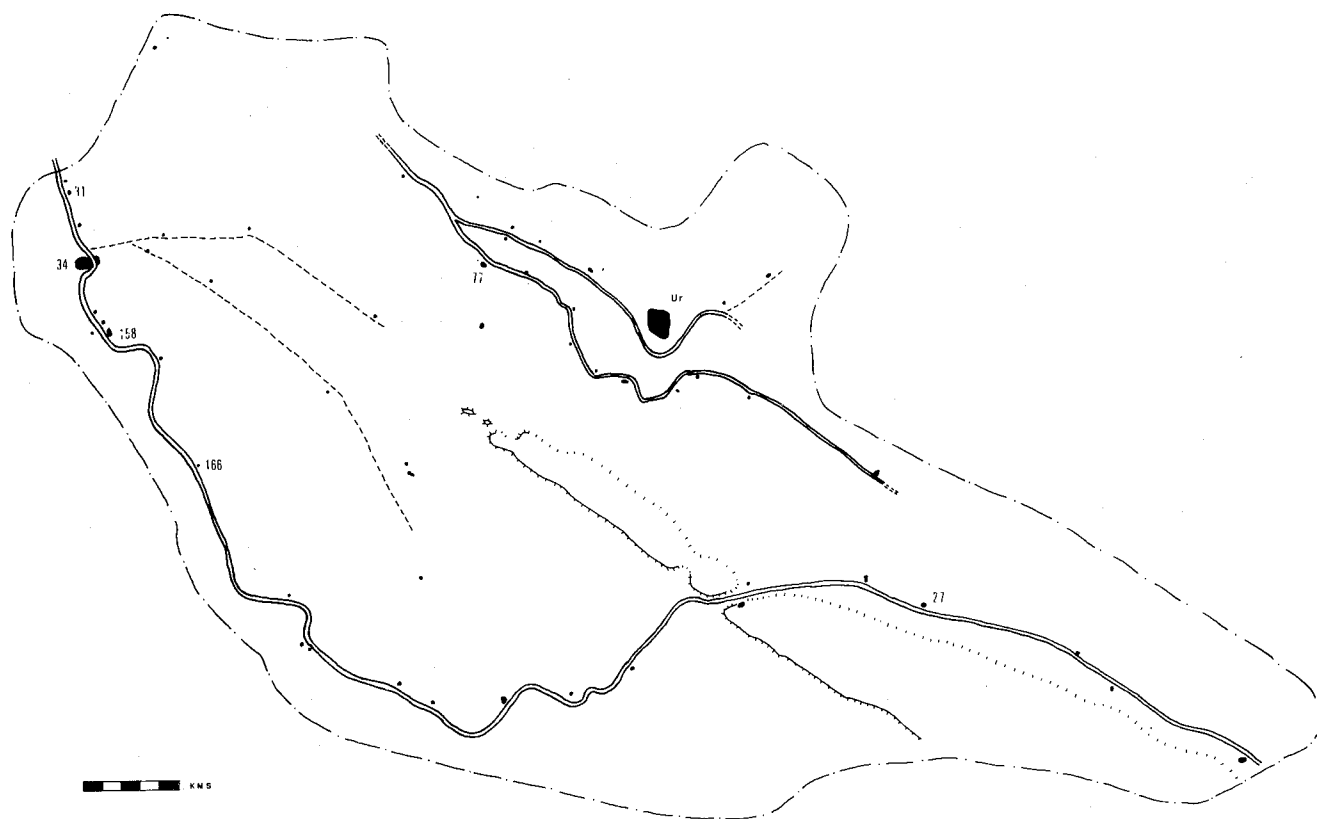


Fig. 21. Settlements of the Late Larsa and Old Babylonian period.

possible explanations of the ceramic differences between this large town and other sites of the period, and only further work on this interesting settlement cluster will clarify these issues.

Even if these possibly later settlements are removed from consideration, there is an almost continuous network of settlements south and west of Ur. Assuming a minimum size for Ur of 60 hectares, the total settlement area occupied is about 198 hectares, indicating a population of almost 25,000 to 40,000, less than a third of it in the city itself. Even if 60 hectares is discounted for the possible later group to the west, this is a greater area than was covered in the preceding Ur III–Early Larsa period, and population would have been at most 17,100 to 27,500. This is at variance with Woolley's suggestion of 250,000 persons for Ur and the nearby villages alone (1965, p. 193).

Given a total area potentially cultivable—that is, silty and salt-free soils accessible to water—of about 130,000 hectares, the available amount of land is quite sufficient to support even the maximum population. It may be that either this approach toward near total use of the land sur-

face without the benefit of truly centralized agricultural planning, or the incessant political vicissitudes of the time, or the loss of unearned imperial revenues expended near the capital, led to reduced prosperity: only 39 percent of the thirty-three settlements whose last major occupation was during the Late Larsa–Old Babylonian period had baked bricks on the surface, a marked decrease from the sixty percent of the preceding period.

The extensive abandonment of settlements between the Ur III–Early Larsa period and the Late Larsa–Old Babylonian period raises the problem of social continuity. Even though the ceramic complexes are similar and clearly are developmentally related, only about 10 percent of the settlements of the earlier period were occupied in the latter period. It is possible that there was a hiatus in occupation between the two periods, but there is little textual evidence for such. Alternatively, there may have been a fairly abrupt series of channel shifts, perhaps precipitated by irrigation works undertaken farther upstream, requiring much movement of villages.

Between the Late Larsa–Old Babylonian period and the Cassite period there is also extensive abandonment. In this

case, however, abandonment is accompanied by a discontinuity in ceramic styles. The writing of legal and economic texts ceases at Ur about 1740 B.C. (Stone 1977, fig. 2), and commercial life does not revive until about 1400 B.C., approximately 250 years after the beginning of the Cassite dynasty. Given this evidence, it is possible that the small settlements in the hinterlands south of Ur were little occupied for two or three centuries.

In any event, there is an impressive Cassite regeneration of settlement. Ur itself appears to remain contracted within its Third Dynasty walls, but many of its temples were restored under the sponsorship of Kurigalzu II. Of the thirty-nine other recorded settlements, 79 percent had no preceding Late Larsa–Old Babylonian occupation. There are four smaller towns, all on the southern channel that runs past the ruins of Eridu (fig. 22). As before, the lowest is Tell al-Lahm (EP-172). Thirty kilometers above this and only 15 kilometers southwest of Ur is a town of almost 18 hectares (EP-89); 25 kilometers above this is the next town (EP-100), and 35 kilometers beyond lies another (EP-36). Thus, towns are slightly larger and more widely spaced than during the Late Larsa–Old Baby-

lonian period. Several of these are on the south side of the channel, as are a number of villages, indicating that there was little threat from the desert at this time. Small and large villages are found on both the Ur channel and the Eridu channel, but not in the land between. Spacing is irregular, and closely associated pairs are notable, suggesting that some sites may not be contemporary. This is the earliest period for which a number of small canals could be defined on the air photographs. Most striking are those 7 kilometers east-northeast of the ruins of Eridu, where small field canals and even possible furrows could be seen from ground level, outlined in the salt crust. This area deserves detailed study (EP-23).

The total settled area of the Cassite period covered about 179 hectares, suggesting a population at most of 22,500 to 36,000. However, with the abandonment of the area between the two channels, only about 85,000 hectares would have been available for cultivation—still adequate but close to the limit. As in the preceding period, baked brick is not common. Only 43 percent of the twenty-three sites without major occupation after the Cassite period have baked brick fragments.

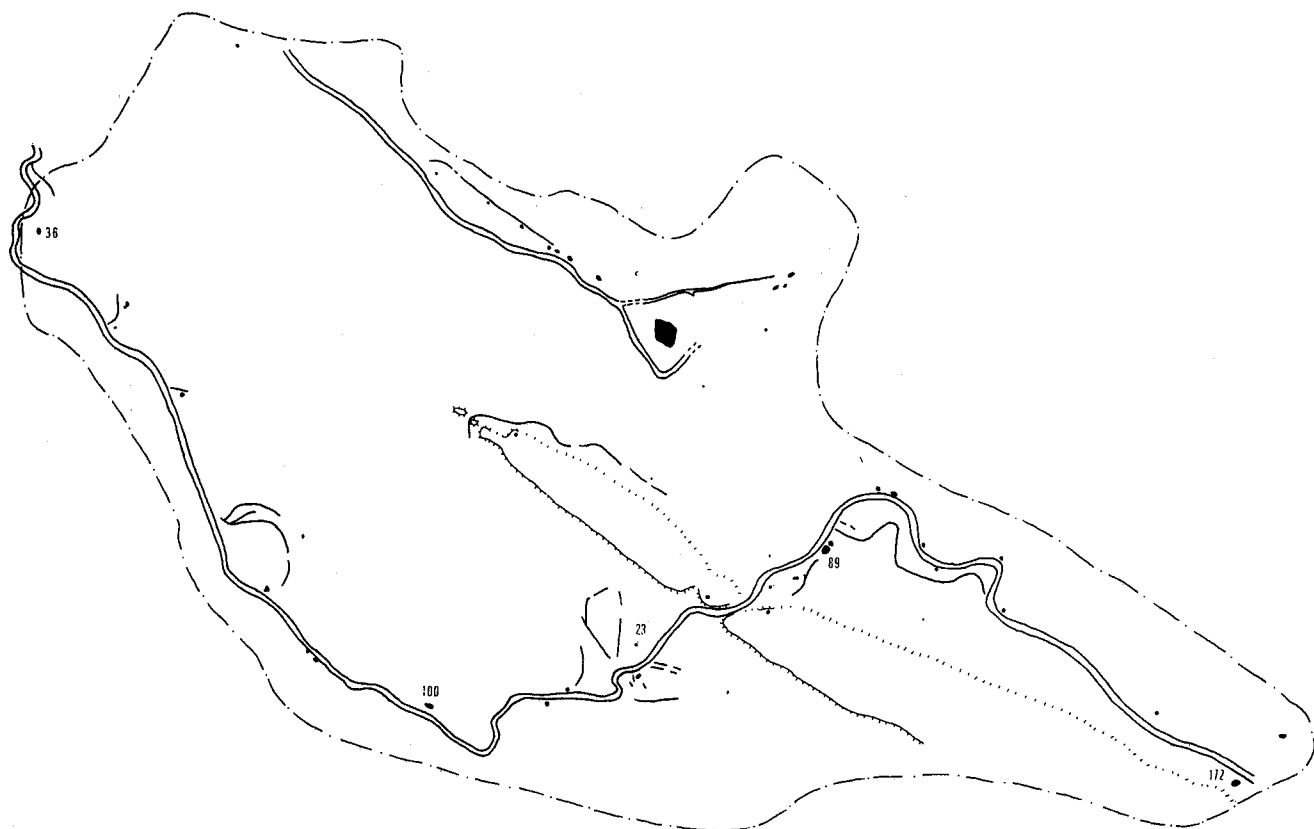


Fig. 22. Settlements of the Cassite period.

## Appendix: The Southern Margins of Sumer

The rapid decline of the Cassite dynasty after 1200 B.C. did not bring immediate ruin to the southern margins of Sumer. Though there is population decline and local abandonment, there is much continuity in both the ceramic technology and the settlements. Almost half the settlements with the ceramics termed "Post-Cassite" were occupied in the preceding period; only 53 percent of the settlements are at locations unoccupied in Cassite times, a strong contrast to the lack of continuity between the previously discussed time periods. However, this continuity does not obscure the evidence of decline: Ur itself has only a few evidences of the repair of temples, and none of actual rebuildings. Its precise size is unknown, but it was probably smaller than in Cassite times. The former Ur channel survives only as a small canal (fig. 23) watering the immediate vicinity of Ur and a few nearby villages. On the southernmost Euphrates channel, only the three easternmost towns survive. Villages are spaced along this stretch every 5 kilometers; the western portion of this channel within the surveyed area was little occupied. Here and there, small canal systems are visible on the air photographs.

In the survey area as a whole, the 139 hectares of Post-Cassite settlement indicate a population of at most 16,800 to 27,000 persons. There was little relative change in the prosperity of these communities, since, of the twenty-three sites without subsequent major occupation, about 39 percent had baked brick fragments on their surfaces. In addition, a number of settlements, some of them quite small, were on the south side of the southern channel, unprotected from the deserts beyond, indicating little fear of attack from that quarter. It is possible that this period of continued prosperity and relatively peaceful local conditions southeast of Ur is related to the brief rise of the so-called Second Dynasty of the Sealands in the area centered to the east of Tell al-Lahm around the present Hor al-Hammar (Brinkman 1968).

Dating to this period of the decline of settled life on the lower alluvium is a striking channel feature visible on the air photographs, beginning just east of site EP-183 (fig. 1). Here a channel, similar in form and size to the occupied Post-Cassite channel, cut through the left bank levee and flowed for at least 20 kilometers. The location at which it diverges slopes downward to the northeast, at a point

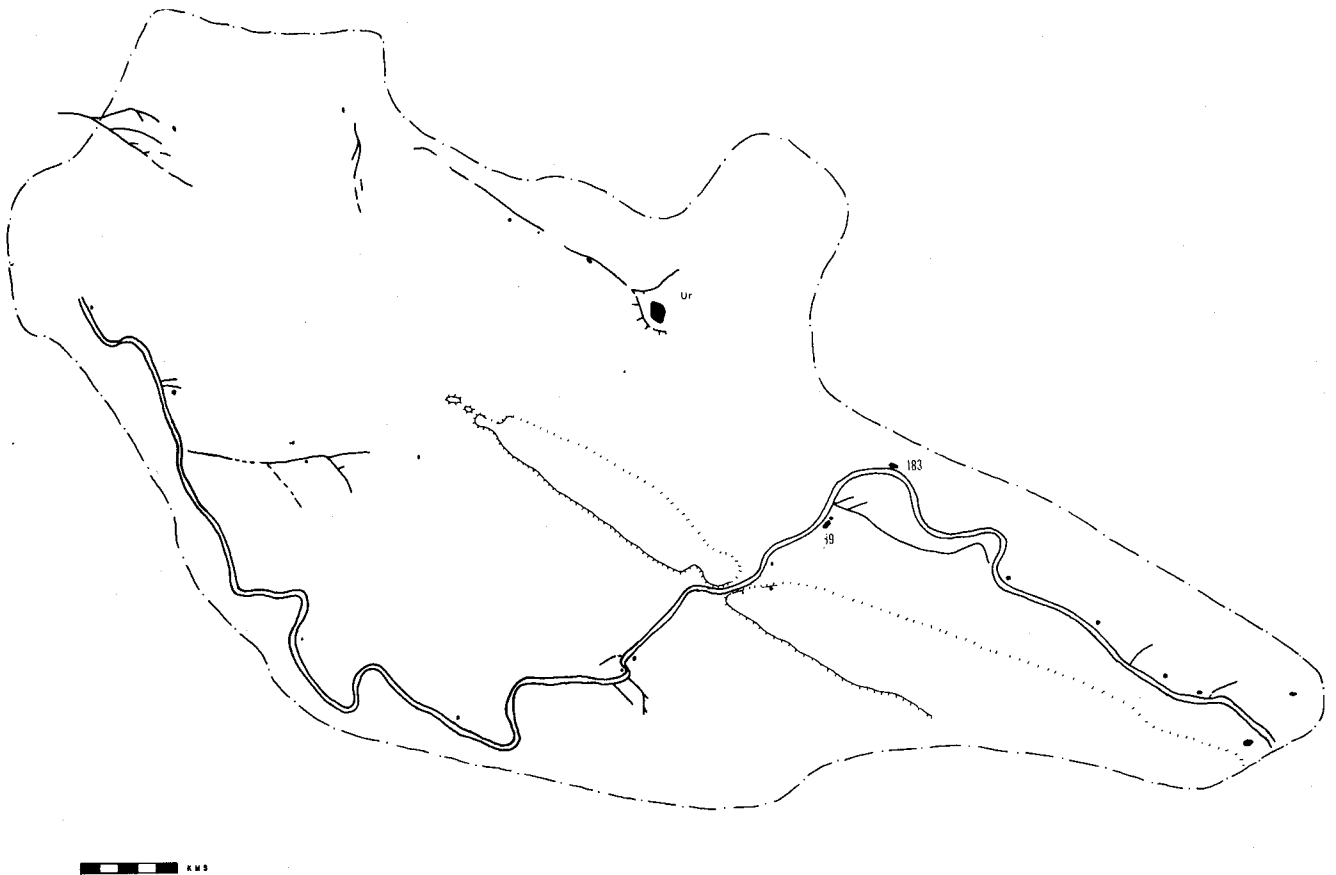


Fig. 23. Settlements of the Post-Cassite period.

where it would be easy to break the levee, flooding a large area to the east. Though flow continued for long enough to establish a definite channel, there was no settlement along its banks. Subsequently the river was diverted back into its former course running by Tell al-Lahm, perhaps ancient Kisiga (Jacobsen 1960, pl. 28), a known Sealand town (Brinkman 1968). This repair must have occurred during the Post-Cassite period, since a small canal running due north of a Post-Cassite village (EP-189) clearly crosses this channel. Without excavation, it cannot be demonstrated that there was a deliberate cutting of the main Euphrates channel for military purposes, rather than a natural calamity. However, such a tactic would be expected to leave precisely this kind of evidence.

The decline at the end of the Post-Cassite period can be seen as the end of single cycle of growth and decay spanning a millennium and a half. Growth began during the Akkadian period about 2300 B.C., reached an apogee in Late Larsa times about 1800 B.C., and declined to another low point before 900 B.C. However, this seeming demographic cycle does not represent the trajectory of a single type of cultural system or even of a single type of cultural system. In the first place, the growth and decline of settlement is apparently episodic. There was certainly a major decline of rural settlement between the Late Larsa–Old Babylonian peak and the Cassite peak, and there may have been a similar decline between Ur III–Early Larsa and Late Larsa–Old Babylonian. Other oscillations may be obscured by our yet elementary understanding of ceramic development. This episodic character contrasts with the apparently more continuous pattern of growth and decline to the north and northeast (Adams, this volume), perhaps reflecting the marginal position of southern Sumer, with its communities exposed to desert raiders and the difficulties of maintaining the flow of water in the southernmost Euphrates channel. In the second place, this long period of oscillating growth and decline is apparently one of considerable social and economic change: the earlier portion of the cycle is one in which central institutions, many of them direct organs of government, dominate the economy, while from Late Larsa times onward independent entrepreneurs and corporations seem dominant (Oppenheim 1964, pp. 83–109). Perhaps the rise in importance of small towns in Cassite and Post-Cassite times is a consequence of such basic social and economic changes. Alternatively, however, the rise of such towns may be a local phenomenon resulting from the loss of Ur's political importance after the fall of the Third Dynasty. Further textual and comparative settlement studies will eventually settle such issues.

#### DEATH OF A REGION (NEO-BABYLONIAN AND LATER)

Settlements occupied during the period from Neo-

Babylonian to Seleucid (and perhaps early Parthian) times are common in the environs of Ur and Eridu. It seems that prosperity once again returned to the region and that Ur and many small towns were thriving. But close examination of the evidence indicates that this would be a misleading conclusion.

Ur itself had an incomplete and relatively low-density occupation at the beginning of this period. Though the temples were restored on a grand scale by the Neo-Babylonian rulers and subsequently maintained by their successors (Woolley 1962), the city was difficult to supply with water. Early in the period, water could still be brought to Ur, and even to villages beyond, by a small canal running along the old Euphrates levee. However, this earlier construction is cut by one that leads water to the gardens around Ur by a canal coming from the north on a raised causeway (fig. 24). Examination of the southern end of this causeway reveals that its fill was consolidated with ceramic slag. Water must have been raised from the level of the Euphrates to the level of the causeway by a device such as a current-powered waterwheel.

While the old Ur channel gradually died, the southernmost channel, running by the ruins of Eridu, still flourished. There were three substantial towns. The easternmost was the northern extension of Tell al-Lahm (EP-173) covering 14 hectares; 43 kilometers upstream was Eridu South (EP-108), covering 22 hectares; 45 kilometers farther by the circuitous river was Tell ud-Dahaila (EP-148), also 14 hectares. Villages are irregularly spaced along the channel between the towns, averaging 12 kilometers apart. Most of these settlements are on the north or left bank, one of the exceptions being a fort with corner bastions (EP-163) opposite Dahaila (fig. 26). Apparently desert peoples were once again a threat. The area between this southernmost channel and Ur was again watered by a series of small canals, as it was in Late Larsa–Old Babylonian times. Several of these canals begin as straight, probably planned constructions but become quite sinuous at their tails, indicating that growth late in their history of use was by accretion. Field patterns of this last major period of settled occupation are visible in several places.

The total settled area of this period is 160 hectares, indicating a maximum population of 20,000 to 32,000. However, this period of time is long, and the irregular settlement spacing and overlapping small canals suggest that the settlements were not all contemporary. Of the thirty-six settlements without subsequent occupation, 31 percent had baked bricks on their surface, which suggests that the villagers were not as prosperous as those of preceding periods. However, when it is possible to date sites to shorter spans of time within this period, it may be possible to show that the initial time of canal restoration was relatively prosperous, and there was a gradual or oscillating abandonment thereafter.

Within the surveyed area, there is only one small village



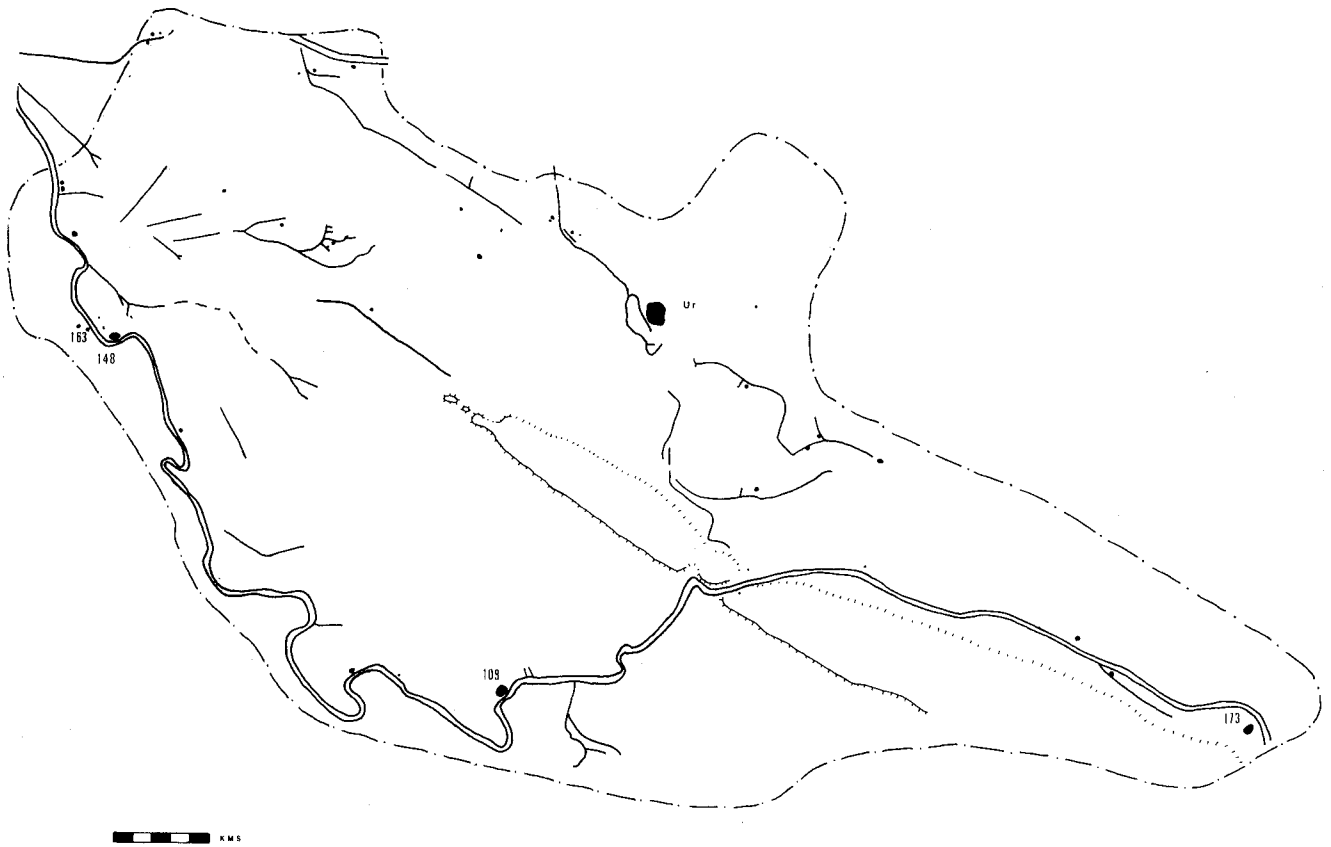


Fig. 24. Settlements of the Neo-Babylonian and later periods.

site with definite Parthian ceramics (EP-54). This site is very near the above-mentioned causeway leading water toward Ur, and it is possible that this watercourse was maintained after settlement was no longer possible in the rest of the area. Apparently the southernmost channel was unoccupied; but one must remember that the three towns of the preceding period were high and badly eroded mounds. It is possible that evidence of lingering reduced occupation in Parthian times has been removed by natural forces.

Two Sasanian settlements were recorded. One is a square fortified settlement of 5.0 hectares close to the present Euphrates near modern Bat-ha (EP-65) (fig. 26). A short distance to the west, and on the flanks of a Neo-Babylonian–Achaemenian village site, is a small mound covered with glass sherds and glass cullet of a type that is probably Sasanian in age (Robert Brill, pers. comm.). Apparently the settlement had resident craft specialists as well as farmers and/or border guards. The other site with Sasanian ceramics is a small possible cemetery (EP-32) beside the southernmost channel at the extreme western end of the survey area. Is this the isolated cemetery of no-

mads, or was there some water moving down the southern channel watering villages just beyond the survey's limits? Visible on the air photographs, which I did not see until after I returned to Baghdad, about 8 kilometers west of the survey border is a roughly rectangular walled town, covering 55 hectares and divided into three parts. It is similar in plan to Jundi Shahpur and Iwan-i Karkheh in southwestern Iran (Adams 1961, figs. 5, 7) and is probably a Parthian or Sasanian center. Perhaps when the present levee of the Euphrates is examined in detail we will find that EP-65 is one of a series of fortified settlements linked to this larger town, with installations such as al-Qusair (Finster and Schmidt 1976, pp. 49–54) being either elements in an outer line of defense or posts designed to protect routes coming from the south.

There is no indication of Islamic occupation until relatively recent times. It is therefore reasonable to ask why the southernmost channel of the Euphrates ceased to carry water. It is possible that the reasons are purely geological. For example, the causeway canal that allowed life to continue at Ur implies that the Euphrates water level was lower than previously. Such geological explana-

## Appendix: The Southern Margins of Sumer

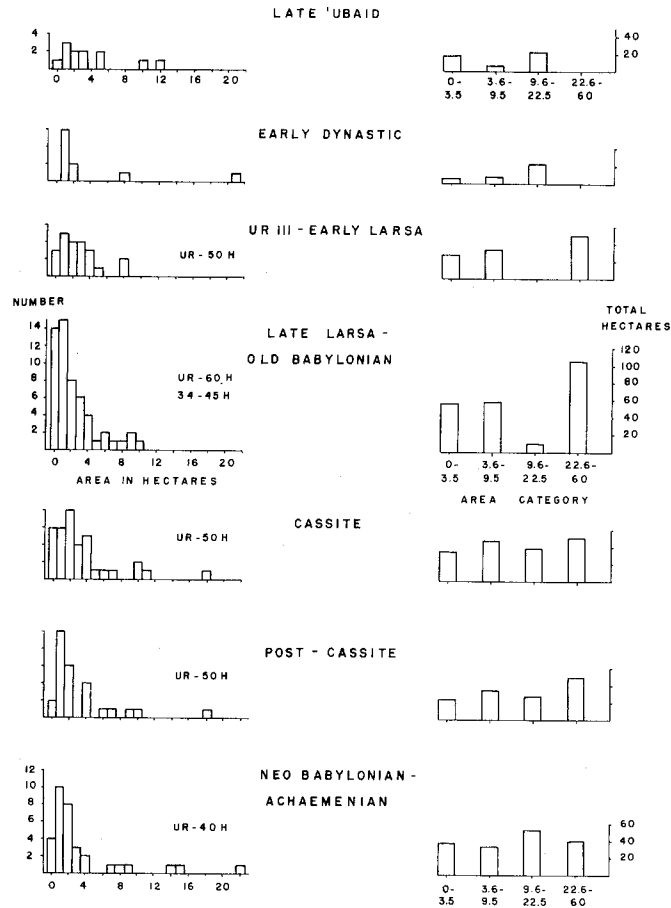


Fig. 25. Patterns of settlement and population in southern Sumer.

tions can be tested only by a competent geomorphologist with accurate maps in hand. Alternatively, it is possible that the reasons are cultural. Camel-mounted nomads of the first millennium B.C. and after were doubtless far more difficult to handle than their predecessors. It is likely that the evidence needed to answer the problem will lie not within the limits of the Ur-Eridu survey area, but to the northwest in the land between modern Samawa and modern Hilla, one of the three large tracts of the lower alluvium (along with that along and east of the Shatt al-Gharraf and that along the Tigris) that have not yet been systematically surveyed.

### CONCLUDING REMARKS

The geographical history of southern Sumer is for the most part a footnote to events occurring elsewhere. While specific events here may be relevant to particular periods of development in the more densely settled central regions of the alluvium, there is at least one general lesson to be drawn from this survey. This is that settlement in this border area is distinctly episodic, with frequent

periods of collapse. While there are such interludes in the central regions, they seem less frequent. If we are to move beyond the simple recording of such historical episodes to a processual understanding, two lines of future research must be pursued.

One such line is more detailed survey, with a focus on more limited periods of time. The value of resurvey using more refined chronologies and more rigorous field observations of sites is well illustrated by Adams's reconsideration of the Uruk period presented in this volume. Furthermore, this reconsideration has raised issues that can be answered only with even more intensive survey involving small-scale excavations on samples of rural sites and on canal and field remains. In southern Sumer, combined resurvey/excavation programs might focus on Ubaid to Jemdet Nasr period settlements and canals between Eridu and Rejibah, on Late Larsa and Old Babylonian remains around the town site of EP-34, or on Cassite and Post-Cassite settlements, canals, and fields between Eridu South and Tell al-Lahm.

Another future line of research is the survey of the Southern Desert beyond the great dunes. It is there that

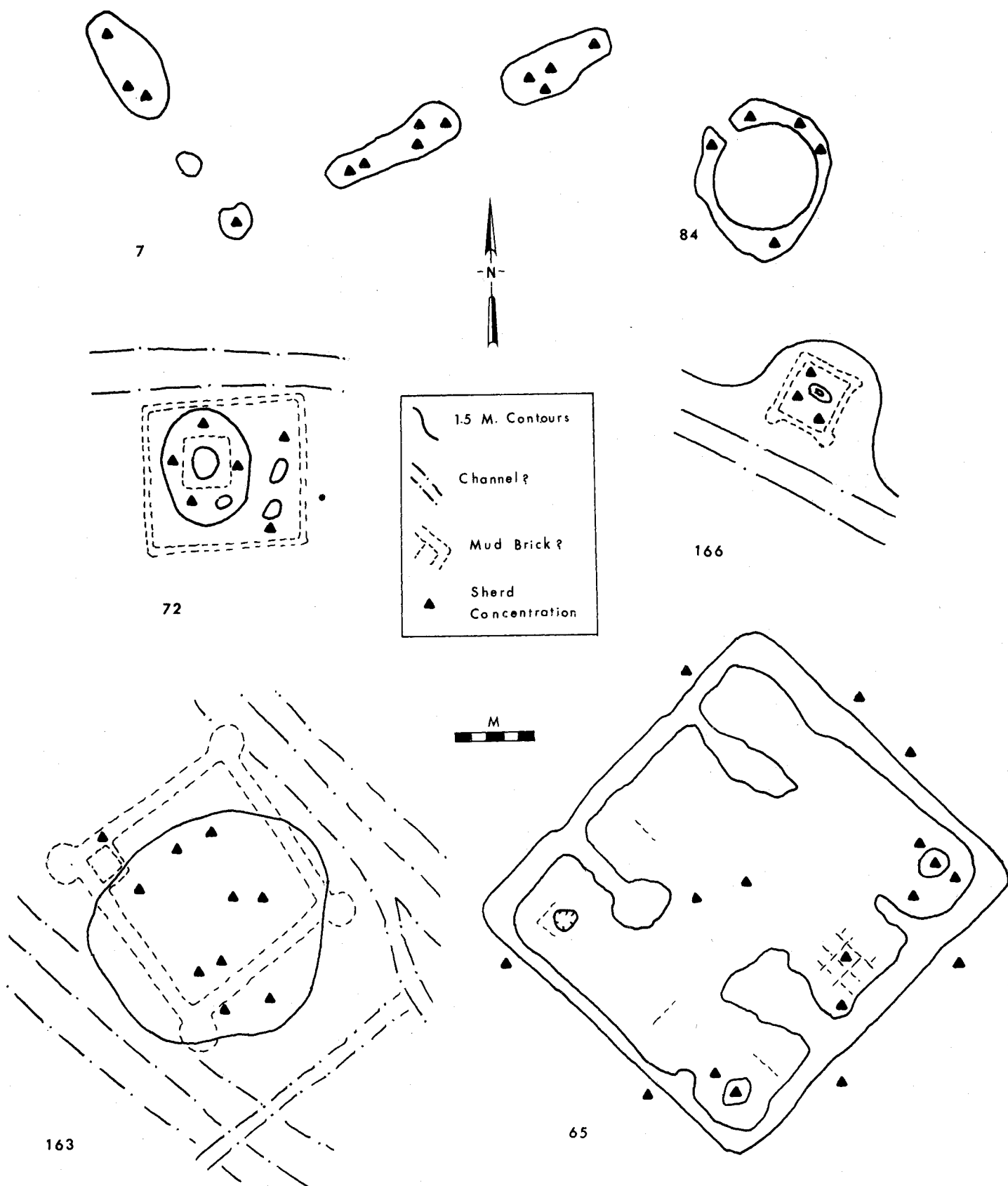


Fig. 26. Selected settlement maps.

direct evidence of nomadic people must be sought. Although the methods needed to do such survey are only now being developed, and though it seems certain that

their application will prove time-consuming and tedious, such survey must be undertaken if we are to gain an understanding of the oscillation of imperial control.

## Eridu-Ur Survey Data: Site Catalog

### INTRODUCTION

This catalog presents most of the actual data upon which the foregoing is based. For each site it gives the site number, the local and ancient names when known, the length (plus orientation), width, and height in meters, and the existence of any baked bricks (with measurements in centimeters), slag, stone, or other features of interest. After this, for each period on the site, it notes the areas in hectares estimated to have been covered during that period, the artifact categories ascribed to that period, using acronyms previously defined, and the counts of each category in the samples. If an artifact category is found in several periods, the counts are entered in the earliest such period thought to be present on the site. These counts include neither all categories of diagnostic sherds found on a site—since very large vessel rims and bases were not collected—nor even all categories present in a sample, since unique pieces were not categorized in the preceding discussion. However, individual drawings and measurements were made of such pieces, and they are included in the field records filed at the Iraq Museum in Baghdad, the Oriental Institute in Chicago, and the Museum of Anthropology in Ann Arbor. Given the collection procedures discussed in this introduction, interested scholars should probably first reduce the counts to a more general scale such as “rare,” “present,” and “common” before engaging in statistical manipulations.

### CATALOG

- 1 Ishan Umm Fushij. 150 NE  $\times$  115  $\times$  3. Broken brick; ceramic slag. Late Larsa: 1 ha (RJ7-5:4, RJ8-1:4, RJ8-3:1, RB8-4:1).
- 2 Tell Ghaghla Gharbi. 350 WNW  $\times$  180  $\times$  3. Brick, 28  $\times$  28  $\times$  7 cm. Late Larsa: 3.5 ha (RJ7-5:2, RJ8-1:6, RJ8-2:1, RJ8-3:1, RB8-1:1, RB8-2:2, RB8-4:8, B7-1:4, B8-1:2); Post-Cassite: trace (RJ9-2:1, RB9-2:3).
- 3 Abu Shahrain, Eridu. Eridu, Hajji Muhammad, Early Ubaid, Late Ubaid: 12 ha; Terminal Ubaid, Uruk, Jemdet Nasr–Early Dynastic: trace; Ur III: trace (see Campbell-Thompson 1919; Hall 1930; Lloyd and Safar 1948; Safar 1947, 1950; Taylor 1855).
- 4 Rejibah Jinub. 450 NW  $\times$  280  $\times$  6. Stone footings; brick, 30  $\times$  30  $\times$  6.5 cm, 29  $\times$  29  $\times$  6.5 cm, 30  $\times$  15  $\times$  7 cm. Jemdet Nasr–Early Dynastic: 8.2 ha (RJ5-2:2, RB5-2:8, B5-3:4, B5-4:2, B5-5:1, O5-2:1); Late Larsa: 3 ha (RJ7-5:8, B7-1:2, RJ8-1:5, RJ8-2:3, RB8-1:4, RB8-2:2, B8-1:3, RB9-2) (see Woolley 1956).
- 5 Rejibah Shamal. 550  $\times$  225  $\times$  2. Ceramic slag; limestone wall footings. Late Ubaid? (O3-1 small, clay axe, interior combed sherd); Uruk? (RB4-1:1); Jemdet Nasr: 12.5 ha (RJ4-1:4, RJ5-1:1, RJ5-2:5, RB5-2:17, RB5-2:20, B5-3:13, B5-4:4, O4-4:1); Late Larsa: trace (RB8-1:2, B7-1:1).
- 6 — 125 NNW  $\times$  85  $\times$  1. Post-Cassite. 0.9 ha (B7-2:4, RB8-1:1, RB9-2:2, B9-1:4).
- 7 — See map, figure 26. Much limestone; ceramic slag; chert flakes. Late Ubaid: trace (RB3-11:1. stone hoe); Uruk: 0.7 ha (RJ4-1:2, RJ4-2:3, RB4-1:4, O4-1:2, O4-2:4, O4-5:1, O4-8:1).
- 8 Tell al-‘Ubaid. Eridu, Hajji Huhammad, Early Ubaid, Late Ubaid, Uruk, Jemdet Nasr, Early Dynastic I, Early Dynastic III, Ur III (see Hall 1930; Hall and Woolley 1927).
- 9 — Not assigned.
- 10 Tell al-Muqayir, Ur. Eridu, Hajji Muhammad, Early Ubaid, Late Ubaid: ca. 10 ha; Terminal Ubaid: 10 ha; Uruk: 10 ha; Jemdet Nasr: ca. 15 ha; Early Dynastic I: 21 ha; Early Dynastic III, Akkadian, Ur III: 50 ha; Late Larsa: 60 ha; Cassite: 50 ha; Post-Cassite, Neo-Babylonian: 40 ha (see Brinkman 1968; Burrows 1935; Gadd and Legrain 1928; Hall 1930; Oates 1960; Woolley 1939, 1956, 1962, 1965, 1974).
- 11–12 Diqdiqah. 12. 305 NE  $\times$  230  $\times$  4. Ceramic slag. Akkadian: 5.9 ha; Ur III (see Woolley 1956, 1974).
- 13 — 170 N  $\times$  130  $\times$  2. Late Larsa: 2.5 ha (B7-1:5, RJ8-1:4, RJ8-2:1, RB8-2:1, RB8-4:3, RB8-5:2, B8-2:1); Cassite: trace (RB9-2:1, RB9-5:1); Neo-Babylonian + : trace (RJ10-1:3 without ridge, B10-1:1, B10-2:1, B10-3:1).
- 14 — 160 WNW  $\times$  70  $\times$  0.5. Late Larsa: 1.1 ha (RJ8-1:1, RB8-2:1, RB8-4:2 [1 with hatched strip and incised curved line], RB8-5:2 thick, B7-1:1, B8-1:1, O8-1:2).
- 15 — Small sherd scatter around recent gravel pit. Cassite: trace (RB9-1:1, RB9-2:1, B7-2:1, B9-1:1).
- 16 Tell Ba‘arura Jinub. 225 NE  $\times$  200  $\times$  3. Broken brick. Early Dynastic (RJ5-2:1, RJ5-5:1, RB5-2:1, RJ6-1:1?); Ur III–Early Larsa: 3.7 ha (RJ7-3:9, RJ7-5:3, B7-1:8, B7-2:1, B7-5:1, O7-1:6); Late

# Appendix: The Southern Margins of Sumer

- Larsa (RJ8-1:9, RJ8-3:2, B8-1:1); Cassite-Post-Cassite (RJ9-1:1, RB9-1:2, RB9-2:2, RB9-3:1, RB9-5:1, B9-1:3).
- 17 Tell Sughariyya. 110 NW  $\times$  80  $\times$  3. Broken brick. Akkadian?: 0.8 ha.
- 18 Tell Ba'arura Shargi. 230 NE  $\times$  130  $\times$  2. Ur III-Early Larsa (RJ7-1:1?, RJ7-5:2, B7-1:3, B7-2:4; Ur III inscribed brick fragment); Late Larsa? (RJ8-3:2, RB8-5:2, B8-3:1); Cassite: 2.5 ha (RB9-1:6 [1 thick], B9-1:1).
- 19 Tell Ba'arura Sughir. 170 N  $\times$  120  $\times$  1.5. Early Dynastic? (stone bowl sherd, chert core); Cassite: 1.8 ha (RB9-2:5, B7-1:1, B7-2:2); Neo-Babylonian +? (B10-2:1).
- 20 Tell Ba'arura Shamal. 300 NE  $\times$  150  $\times$  2.5. Cassite: 3.5 ha (RJ7-5:5?, RJ8-1:1, RB8-1:4, RJ9-1:1, RB9-1:3, RB9-2:4, RB9-3:1, B9-1:1). Recent qual'a ruin.
- 21 Ishan Beni Sa'id. 90 WNW  $\times$  65  $\times$  3. Early Dynastic (O5-6:1); Cassite-Post-Cassite: 0.6 ha (RJ7-5:1, B7-1:1, RJ9-1:3); Neo-Babylonian +: 0.6 ha (RJ10-1:2, RJ10-4:1, RB10-2:1, B10-1:1, B10-2:1, O10-4:1).
- 22 Maftul Shuwemi. 120 NW  $\times$  75  $\times$  1.5. Jemdet Nasr-Early Dynastic: 0.6 ha (RJ4-1:1, RJ5-1:2, RJ5-3:2, RB5-2:10, RB5-3:1, B5-1:1, B5-2:1, B5-3:6); Recent occupation and mud-brick tower.
- 23 — Area of small canal and plow marks visible in salt. Cassite? (B9-1:2, 7 large vats or coffins).
- 24 — 150 NE  $\times$  90  $\times$  3. Brick fragments; ceramic slag; carnelian fragments. Late Larsa: 10 ha (RJ7-5:2, B7-1:1, RJ8-1:3, RJ8-2:1, RJ8-3:4, RB8-1:1 thick, RB8-3:3 [2 with incised curved line], RB8-5:3 [2 thick], B8-1:5, O8-1:1); Post-Cassite: 1.0 ha (RJ9-2:1, RB9-1:3 [1 with incised wavy line, 2 thick], RB9-2:7, B9-2:1).
- 25 — 310 NE  $\times$  220  $\times$  2. Brick fragments. Cassite: 3.5 ha (RJ7-5:2, B7-1:2, B7-3:1, RJ9-2:3, RB9-1:1, RB9-2:4, B9-1:2, O9-1:1).
- 26 — Thoroughly plundered cemetery. Early Larsa to Cassite.
- 27 Tell Abu Ras'ain. 310 NNE  $\times$  280  $\times$  4. Broken bricks. Early Larsa (RJ7-1:1, RJ7-5:1, B7-1:2, O7-1:1); Late Larsa: 6 ha (RJ8-1:10, RJ8-2:3, RJ8-3:1, RB8-1:2 [1 with incised curved line], RB8-3:3, RB8-5:5 thick, B8-1:1, B8-2:1, O8-1:6); Cassite: trace (RB9-1:3 with wavy combed decoration, RB9-5:1) (see Campbell-Thompson 1919).
- 28 Tell Abu Salabikh. 270 N  $\times$  150  $\times$  2.5. Broken bricks; ceramic slag; carnelian debris. Jemdet Nasr-Early Dynastic? (RB5-2:1, stone bowl sherd); Late Larsa: 3 ha (B7-1:1, B7-3:1 without button, RJ8-1:12, RJ8-2:3, RJ8-3:1, RB8-2:1, RB8-3:2, RB8-4:2 with large groove, RB8-5:1, B8-1:3, B8-2:3, O8-1:7, O8-2:1); Neo-Babylonian +: trace (RJ10-1:1 without ridge, B10-1:1) (see Campbell-Thompson 1919).
- 29 Merejib. 170 E  $\times$  150  $\times$  2. Gypsum cement brick footings. Early Ubaid (RJ2-1:2, RB2-1:8, RB2-3:1); Late Ubaid (RB3-2:2, RB3-11:1, RB3-12:6, RB3-14:1, O3-1:14, O3-2:2); Uruk: 1.6 ha (RJ4-1:3, O4-1:1, O4-2:2, O4-3:1, O4-5:1); Jemdet Nasr-Early Dynastic: 1 ha (RJ5-1:4, RJ5-2:2, RJ5-3:1, RJ5-4:2, RB5-2:1, RB5-3:1, RB5-7:2, B5-3:2, O5-2:3, O5-4:3, O5-5:1, O5-6:2, O5-7:2); Cassite-Post-Cassite?: 0.2 ha (RJ7-5:1, B7-1:1, B7-2:1). (See Woolley 1956.)
- 30 Tell al-Sakheri. 360 N  $\times$  300  $\times$  6. Bricks, 31.5  $\times$  31  $\times$  6.5 cm, 27  $\times$  16.5  $\times$  7.5 cm, 25  $\times$  16.5  $\times$  7.2 cm, 23  $\times$  14  $\times$  6.6 cm; ceramic slag. Jemdet Nasr-Early Dynastic I, ca. 8 ha (RJ5-1:6, RJ5-2:1, RJ5-3:20, RJ5-4:4, RB5-2:44, RB5-7:2, B5-1:6, B5-3:7, B5-4:10, O5-1:1, O5-2:3, O5-3:1, O5-5:1, O5-7:3); Early Dynastic III, ca. 4 ha; Akkadian: ca. 2 (RJ6-1:1, RJ6-2:1, RJ6-3:2); Ur III-Early Larsa: ca. 3.5 ha (RJ7-1:6, B7-4:1); Late Larsa?: trace (RB8-4:1).
- 31 south Tell Khorsadah. 310 N  $\times$  240  $\times$  4. Bricks, 36  $\times$  36  $\times$  6 cm, 35  $\times$  35  $\times$  7 cm, 37  $\times$  37  $\times$  7 cm, 35  $\times$  17  $\times$  8 cm, 24  $\times$  19  $\times$  8 cm. Early Dynastic (RB5-1:1, stone bowl sherd); Late Larsa: 6.5 ha (RJ7-2:1?, RJ7-5:3, B7-1:1, RJ8-1:3, RJ8-3:1, B8-1:1, B9-3:1); Neo-Babylonian +: 3 ha (RJ10-1:8 [5 without ridge], RJ10-2:4, RB10-2:1, RB10-3:1, RB10-4:1 thick, B10-2:3, B10-4:1, O10-3:1).
- 31 center — 230 E  $\times$  100  $\times$  2. Uruk cultivation (O4-8:1); Neo-Babylonian +: 1.9 ha (RJ10-1:9 [7 without ridge], RJ10-5:1, B7-1:2, B10-2:1, B10-4:2, O10-4:1).
- 31 north — 90 E  $\times$  70  $\times$  1. Late Larsa: 0.5 ha (RJ8-1:3, RJ8-2:1, RJ8-3:1, B8-1:1, O8-1:1; carnelian fragments).
- 32 — Ca. twenty small pottery concentrations in an area ca. 300 m in diameter, perhaps an eroded cemetery. Sasanian?
- 33 — 230 E  $\times$  170  $\times$  1. Ceramic slag. Uruk cultivation (O4-8:1); Late Larsa? (RJ8-1:1, RB6-1:3, RB8-5:2, RB9-5:1, O8-1:1; Neo-Babylonian +: 2.7 ha (RJ10-1:5, RJ10-2:3, RJ10-3:1, RB10-1:1, B10-1:1, B10-2:1, RB10-1:1, B10-1:1, B10-2:1, O10-3:1, O10-4:1, O10-9:1).
- 34 Ca. 1,300 ENE  $\times$  900  $\times$  2. Bricks, 32  $\times$  32  $\times$  6.5 cm, 38  $\times$  38  $\times$  6 cm, 33  $\times$  16  $\times$  6.5 cm, 51  $\times$  50  $\times$  8 cm, 65  $\times$  64  $\times$  7 cm; ceramic slag; carnelian; flat cuprous fragments. Late Larsa: ca. 85 ha (RB5-2:1, RB6-1:2, B7-1:5, RJ8-1:23, RJ8-2:3, RJ8-3:1, RB8-4:12, RB8-5:1, B8-1:8, B8-2:2, B8-3:1, O8-1:1, O8-2:2).
- 35 490 N  $\times$  275  $\times$  2. Brick fragments. Ur III-Early Larsa (RJ7-1:2?, RJ7-3:4, RJ7-4:2 large, B7-2:2

# Appendix: The Southern Margins of Sumer

- large, B7-5:2); Late Larsa? (RJ8-1:2, RJ8-3:3); Cassite: 9.8 ha (RJ9-1:1, B9-1:1, O9-1:2).
- 36 320 N × 275 × 1. Ubaid-Uruk? (O3-1:1, O4-7:1); Ur III–Early Larsa: 5.2 ha (RJ7-3:1, RJ7-5:2, B7-1:2, B7-2:2, B7-5:2); Late Larsa? (RJ8-1:2, RB8-4:1); Cassite: 5.2 ha (RB9-1:3, RB9-2:4, RB9-3:2, B9-1:3).
- 37 ——— Outside survey area.
- 38 Wahashit al-'Ash'ali. Outside survey area. Sherds scattered on sand dune. Ubaid (RB2-1:1, RJ3-1:4, RJ3-2:2, RB3-1:5, RB3-2:4, RB3-4:4, RB3-5:2, RB3-7:1, RB3-8:2, RB3-14:1, RB3-15:1, O3-1:15).
- 39 150 E × 120 × 1. Bricks in square pit. Late Larsa: 1.6 ha (B7-1:2, B7-3:1, B7-5:2, B7-6:1, RJ8-1:5, RJ8-2:4, O8-1:4); Neo-Babylonian +? (R10-1:1, without ridge).
- 40–45 ——— Outside survey area.
- 46 Eridu Shamal. 250 NNW × 225 × 2. Jemdet Nasr–Early Dynastic: 2.7 ha (RJ4-1:4, O4-4:4, RJ5-3:5, RJ5-4:1, RB5-2:27, RB5-3:1, B5-3:5, B5-4:19, O5-2:4); Ur III–Early Larsa: trace (RB8-1:1) (see Safar 1950).
- 47 Sakheri Sughir. 230 E × 110 × 0.5. Bricks. Early Dynastic: 1.7 ha (RJ5-1:5, RJ5-3:5, RJ5-4:1, RJ5-5:4, RB5-2:4, RB5-7:6, B5-3:2, B5-4:1, B5-5:1, O4-1:1, O5-2:5, O5-3:3, O5-4:2, O5-5:1, O5-7:4); Larsa? (RB6-1:1); Neo-Babylonian +? (RJ10-1:1) (see Wright 1969).
- 48 Tell Shaman Gharbi. 130 E × 120 × 2. Bricks. Late Larsa? (RB6-1:1, RJ7-5:1, RJ8-1:2, B8-2:1); Neo-Babylonian +: 1.1 ha (RJ10-1:9 [1 hatched ridge, 1 without ridge], RJ10-2:2, RJ10-3:1, RB10-1:3, RB9-2:1, B10-1:2, O10-3:1 leg, O10-4:2, O10-7:1, O10-8:1, O10-9:2).
- 49 ——— Line of ceramic slag piles.
- 50 Tell Sakheri Shargi. 285 N × 250 × 3.5. Bricks. Neo-Babylonian +: 2.9 ha (RJ10-1:16 [1 glazed], RJ10-2:6 [1 glazed], RJ10-3:2, RJ10-4:1, RB10-2:9, RB10-3:4, RB10-4:3, RB10-5:2, B10-1:7, O10-3:1, O10-6:3).
- 51 ——— 290 E × 140 × 2. Bricks. Ubaid cultivation (O3-1:1); Ur III–Early Larsa: 3.9 ha (RJ7-1:1, RJ7-2:4, RJ7-3:4, B7-2:5, B7-3:3, B7-5:3); Cassite: 3.9 ha (RJ8-3:5, RB8-1:1, RB9-1:3, RB9-2:5, RB9-3:1, B9-1:2, B9-2:1, O9-1:1), inscribed brick.
- 52 (71) ——— 90 NW × 70 × 2. Bricks, 23 × 15 × 6.5. Jemdet Nasr–Early Dynastic cultivation (O5-7:1); Late Larsa: 0.4 ha (B7-1:1, B7-3:1, RJ8-1:12, RJ8-2:2, RJ8-3:8, RB8-4:12 [10 with large groove], RB8-5:4 thick, B8-1:2, B8-2:1, O8-1:8); Post-Cassite: trace? (RJ9-2:1, RB9-2:4); Neo-Babylonian +: trace? (RJ10-1:1 without ridge, RJ10-2:1, B10-4:1).
- 53 Tell Sakheri Jinub. 180 WNW × 150 × 3. Bricks; brick drain. Ur III–Early Larsa: 1.8 ha (RJ7-1:3, RJ7-2:1, RJ7-3:5, RJ7-4:3, RJ7-5:2, B7-2:3, B7-5:2); Late Larsa: 1.8 ha (RJ8-1:5, RB8-2:1, RB8-4:1, RB8-5:1, O8-1:1); Cassite–Post-Cassite: 1.8 ha (RJ9-1:1, RB9-3:1, RB9-1:1, RB9-3:2, RB9-4:2, B9-1:2); Neo-Babylonian +: trace (B10-2:1, B10-3:1).
- 54 ——— 160 N × 80 × 0. A scatter of sherds. Late Larsa?: trace (RB8-3:1, RB8-5:1, B8-2:1); Neo-Babylonian +: 0.8 ha (RJ10-1:12 [1 without ridge, 1 with hatched ridge], RJ10-2:6, RJ10-4:2, RB10-1:2, RB10-2:2, RB10-3:3, B10-1:1, O10-3:1, O10-4:3, O10-8:2).
- 55 ——— 310 W × 125 × 2. Bricks. Ubaid? (O3-1:1, O3-3:1); Ur III–Early Larsa: 2.8 ha (RJ7-3:4, RJ7-5:5, B7-1:4, B7-2:1, B7-3:3, B7-5:1); Cassite: 2.8 ha (RJ8-1:2, RB8-1:4, RJ9-1:3, RB9-1:5, RB9-2:7, B9-1:3).
- 56 ——— 220 WNW × 130 × 2. Bricks. Ur III–Larsa? (RJ7-5:4, B7-2:3, B7-5:2, RJ8-3:1, RB8-1:1, B8-3:2); Post-Cassite: 2.2 ha (RJ9-1:3, RJ9-3:1 large, RB9-1:7, RB9-2:10, RB9-3:1, RB9-5:1, O9-1:1).
- 57 ——— 100 NNW × 80 × 0.5. Bricks. Late Larsa: 0.4 ha (B7-1:1, B7-2:1, B7-6:1, RJ8-1:2, RJ8-3:1, O8-1:1); Cassite: 0.4 ha (RB9-1:3, RB9-2:5, RB9-3:1, B9-1:2, O9-1:1).
- 58 Tell Umm al-Dhab. Bricks. Ur III–Early Larsa: 3.1 ha (RJ7-1:1, RJ7-2:9, RJ7-3:11, RJ7-4:4, B7-2:1 small, B7-4:3, B7-5:2, B7-6:5, O7-1:1); Late Larsa +: trace (RJ8-1:3, RJ8-3:5, RB8-2:2, O8-1:3, RB9-2:2) (see Jacobsen 1960, "Sugheri West").
- 59 ——— 60 E × 40 × 1. Late Larsa? (B7-1:2, B7-2:3, RJ7-5:6, RJ8-1:2, RB8-1:2); Cassite: 0.2 ha (RJ9-1:3, RB9-1:3, RB9-2:8, RB9-3:1, B9-1:1, B9-2:1).
- 60 Ishan Khaiber. 265 NE × 245 × 3. Bricks, 27 × 18 × 7.5 cm; ceramic slag. Late Ubaid (O3-2:1?, O3-3:1, painted sherd); Jemdet Nasr: 3.5 ha (RJ4-1:3, O4-2:1, O4-3:1, O4-4:1, RJ5-1:2, RJ5-4:1, RB5-2:23, RB5-3:15, RB5-4:12, RB5-5:7, B5-3:1, B5-4:13, B5-5:1, O5-2:1, O5-7:2); Ur III–Early Larsa: 0.8 ha (RJ7-1:3, RJ7-2:6, RJ7-3:3, RJ7-4:2, RJ7-5:2, B7-2:1, B7-4:1, RJ8-1:1); Cassite: trace (B9-1:1).
- 61 Tell Gurra. 290 NW × 100 × 3. Late Larsa? (RJ7-5:2, B7-1:2, B7-2:2 small, B7-4:1, RB8-4:2); Post-Cassite: 2.3 ha (RB9-1:1, RB9-2:3, RB9-5:1, B9-1:2, O9-1:1).
- 62 ——— 80 NE × 60 × 0. Sherd scatter. Neo-Babylonian +: 0.3 ha (B7-1:1, B9-3, RJ10-1:8 [1 without ridge], RJ10-5:2, B10-4).
- 63 Umm al-Ghemimi. 170 NW × 100 × 4. Uruk? (O4-2:1, RB5-6:1, stone sherd); Neo-Babylonian +: 1.5 ha (RJ8-1:3 small, RJ10-1:3, RJ10-2:2,

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- RJ10-4:3, B10-1:5, O10-3:2, O10-4:1, O10-5:1, O10-8:1, O10-9:1).
- 64 — 100 NW × 60 × 2. A small site with few sherds but much glass cullet and two cement basins. Perhaps associated with site 65, though close to site 63.
- 65 — 260 × 260 × 2. See map. Sasanian: 5 ha.
- 66 — 270 NW × 120 × 1. Late Larsa? (BJ8-1:1, RB8-3:2 thick, RB8-5:6 [4 glazed]); Neo-Babylonian+: 2.1 ha (RJ10-1:20 [4 without band, 1 with hatched band], RJ10-2:5, RJ10-4:1, RB10-1:2, RB10-2:1, RB10-3:2 glazed, B10-1:3, O10-3:2, O10-4:3).
- 67 Tell Abu Khumoyis. 150 × 150 × 3. Only a few Sasanian and Islamic sherds on what may be a solid mud-brick mass.
- 68 — 50 NW × 40 × 0.5. Late Larsa: 0.2 ha (B7-1:3, RJ8-1:2, RJ8-2:2, RB8-2:1, RB8-5:2 thick, O8-1:4); Neo-Babylonian+: 0.2 ha (RJ10-1:2 without ridge, RJ10-5:1, RB9-2:2, B10-1:1).
- 69 Ishan al-Kharita. 155 E × 150 × 1. Bricks, 25.5 × 25.5 × 6 cm, 25 × 10 × 6 cm. Neo-Babylonian+: 1.6 ha (RJ8-1:1 small, RB8-5:2, RB9-2:1, RJ10-1:4 [1 without ridge], RJ10-2:1, RB10-1:2, O10-4:1, O10-9:2); possible Recent occupation.
- 70 — 145 N × 140 × 1. Ubaid cultivation? (O3-1:1); Late Larsa: 1.5 ha (B7-1:1, RJ8-1:4 [1 small], RJ8-2:2, B8-1:1, O8-1:4, O8-2:1?); Neo-Babylonian+: 1.5 ha (RB9-1 thick, RJ10-1:3 [2 without ridge], B10-4:1, O10-9:1).
- 71 — Same as site 52.
- 72 — 85 E × 80 × 1. Bricks, 23 × 23 × 6 cm; ceramic slag; possible square wall around site (see map, fig. 26). Late Larsa: 0.4 ha (RJ8-1:8, RJ8-3:1, RB8-1:1, RB8-3:1, RB8-4:8, B8-1:2); Neo-Babylonian+: trace (B10-2:1, B10-3:2).
- 73 Ishan Karib Makina Muhammad. 390 WNW × 16 × 2. Bricks, 26 × 16 × 6 cm; ceramic slag. Ubaid cultivation (O3-1:1); Jemdet Nasr–Early Dynastic: ca. 1 ha (RJ5-1:1, RJ5-2:1, stone bowl sherd); Ur III–Early Larsa: 3.7 ha (RJ7-3:7, RJ7-5:9, B7-1:3, B7-2:2 large, B7-5:3); Late Larsa: 3.7 ha (RJ8-1:2, RJ8-3:1, RB8-1:2, O8-1:1); Cassite–Post-Cassite: 3.7 ha (RJ9-1:4, RJ9-3:2, RB9-1:7 [3 with double carination], RB9-2:8, RB9-3:1, RB9-5:1, B9-1:2); fragments of inscribed ceramic cylinder referent to watercourses.
- 74 — Piles of baked bricks, 33 × 33 × 7 cm. Only one green glazed sherd associated.
- 75 Ishan Abu Dhib. 110 E × 105 × 1. Bricks, 27 × 16 × 7 cm. Late Larsa: 0.8 ha (RB6-1:3, B7-1:2, RJ8-1:1, RJ8-2:7, RB8-3:2, RB8-2:1, RB8-4:7 [2 thick, 3 with heavy groove], B8-3:1, O8-1:4, O8-2:1).
- 220 N × 180 × 2. Bricks, 34.5 × 34.5 × 8.5 cm, 19 × 19 × 7 cm. Late Larsa: 2.9 ha (B7-1:3, RJ8-1:10, RJ8-2:3, RB8-4:7, B8-1:5, O8-1:6), Neo-Babylonian+: trace (RB9-2:1, RJ10-1:3 without ridge, RJ10-2:1, B10-2:1, B10-3:1).
- 77 Ishan Mazra 'a 'Ubaid. 350 NE × 320 × 3. Brick fragments. Late Larsa: 6.9 ha (B7-1:2, RJ8-1:5, RJ8-2:1, RB8-1:1 with incised curved line, RB8-4:3, O8-1:1 with incised curved line); Neo-Babylonian+: 6.9 ha (RJ10-1:11 [6 without ridge], RB10-3:1, RB10-4:2, B10-4:1).
- 78 — 145 NW × 85 × 1. Late Larsa: 1.2 ha (B7-1:1, RJ8-1:3, RJ8-2:1, RB8-3:1, RB8-4:3, RB8-5:1, O8-1:1); Post-Cassite: 1.2 ha (RJ9-2:1, RJ9-3:3, RB9-1:1).
- 79 — 100 NE × 90 × 0.5. Planoconvex brick fragments. Ubaid cultivation (O3-1:1, O3-3:1); Early Dynastic: 0.7 ha (RJ4-1:1, RJ5-1:5, RJ5-2:2, RJ5-4:1, RJ5-5:1, RB5-6:9, B5-1:3, B5-2:4, B5-3:2, B5-4:2, O5-1:1, O5-2:4, O5-3:2, O5-4:4, O5-5:1, O5-6:1, O5-7:4); Cassite–Post-Cassite: trace (B9-1:1).
- 80 — 70 × 70 × 0.5. Late Larsa: 0.4 ha (B7-1:1, RJ7-5:1, RJ8-1:5, RJ8-2:2, RB8-2:1, RB8-4:2 with large groove, B8-1:1); Cassite–Post-Cassite: trace (RB9-1:2); Neo-Babylonian+: trace (RJ10-1:1 without ridge, B10-2:1). Indications of former excavation.
- 81 — 115 NNE × 80 × 0.5. Late Larsa: 0.8 ha (RJ7-5:1, B7-1:1, RJ8-1:13, RB8-2:1, RB8-3:1, RB8-4:3, B8-2:4, B8-3:2, O8-1:4); Neo-Babylonian+: trace (RJ10-1 without ridge, B10-3:2).
- 82 — 190 W × 120 × 0.5. Eroded sand knoll; planoconvex bricks, 21 × 13 × 8 cm. Jemdet Nasr–Early Dynastic I: 1.5 ha (O4-1:1, O4-2:1, RJ5-1:7, RJ5-2:4, RJ5-4:1, RJ5-5:1, RB5-2:7, RB5-3:1, RB5-6:8, B5-3:5, B5-4:4, B5-5:2, O5-1:1, O5-2:6, O5-3:1, O5-4:1, O5-5:1, O5-7:1). Many looted graves.
- 83 — Isolated Ubaid artifact (O3-2).
- 84 — See map, fig. 26. 100 N × 80 × 0. Brick fragments. Early Dynastic (O5-6:1); Ur III–Early Larsa (RJ7-1:6, RJ7-2:3, RJ7-3:1, B7-1:2, B7-3:3, B8-2:1). Apparently a circular mud-brick platform, perhaps Early Dynastic in date, once covered with Ur III–Early Larsa refuse, now completely leveled by erosion.
- 85 — 180 NNE × 115 × 0.5. Sherds on eroded remnant of Hazim. Cassite: 1.4 ha (RJ7-5:3, B7-1:1, B7-4:1, RJ8-3:1, RB8-1:2, RJ9-1:1, RB9-1:7, RB9-2:2, RB9-5:1, B9-1:1, B9-2:1, RJ10-2:1).
- 86 Tell Ur Juncshen: 145 × 140 × 2. Late Larsa: 1.8 ha (RJ7-5:1, B7-1:2, RJ8-1:2, RJ8-2:1, RB8-3:1, RB8-4:2, B8-2:1, B8-3:1 small, RJ10-1:1 without ridge).

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- 87 — 70 × 70 × 0.5. Ceramic slag; few sherds. Late Larsa?: 0.3 ha.
- 88 — 125 NNE × 75 × 0.5. Neo-Babylonian+: 0.8 ha (RJ8-1:1 small, RJ8-5:3, RJ10-1:7 [6 without ridge], RJ10-5:4, B10-1:1, B10-1:2, B10-4:2).
- 89 Merejib. 680 NNE × 280 × 3. Bricks, 28 × 28 × 6 cm. Ubaid cultivation? (O3-1:1); Late Larsa? (RJ7-5:5, B7-1:4, B7-2:3, B7-3:2, RJ8-1:1, RJ8-3:2, B8-3:1); Cassite-Post-Cassite: 17.8 ha (RJ9-1:1, RJ9-3:2, RB9-1:4, RB9-2:4, RB9-3:1, RB9-4:1, B9-1:3, B9-2:2, O9-1:1). (Not Woolley's Merejib.)
- 90 — 80 NNW × 65 × 0.5. Late Larsa: 0.4 ha (RJ8-1:3, RJ8-2:2).
- 91 — 80 N × 70 × 0.5. Late Larsa?: 0.5 ha (RB5-2:1, B7-5:3, RJ8-1:1, RB8-3:2, RJ10-1:1 without ridge).
- 92 — Eroded sand knoll. Late Ubaid cultivation (O3-1:1, O3-2:1); Jemdet Nasr, Early Dynastic?: trace (stone bowl sherd).
- 93 — 220 NW × 125 × 0.5. Stone footings. Ubaid cultivation? (O3-1:1); Jemdet Nasr-Early Dynastic: 2.5 ha (RJ5-3:1, RB5-3:1, B5-4:2, O5-2:1); Post-Cassite: 2.5 ha (RJ7-5:4, B7-2:2, B7-3:1, RJ8-3:1, RJ9-2:2, RJ9-3:1, RB9-1:1 large, RB9-2:5, B9-3:2).
- 94 — 135 N × 125 × 0.5. Ubaid (O3-1:1, O3-3:1); Ur III-Early Larsa: 0.6 ha (RJ7-1:2, RJ7-2:1, RJ7-3:5, B7-1:1, B7-2:4 large, B7-3:4 large, B7-4:4 large, B7-5:3); Late Larsa?: trace (RJ8-1:1, RJ8-3:6); Post-Cassite: 0.4 ha (RJ9-1:1, RJ9-2:1, RJ9-3:1, B9-1:1).
- 95 — 145 N × 85 × 1. Recently looted graves to southwest. Late Larsa? (RJ7-5:2, B7-1:3, B7-2:1, B7-4:2, RJ8-1:2, RB8-1:1); Cassite-Post-Cassite: 2.0 ha (RJ9-2:1, RB9-3:1, RB9-1:1, RB9-2:6, RB9-5:1, B9-1:4).
- 96 — 310 NE × 240 × 3. Brick, 29 × 28.5 × 6 cm; concentration of copper debris. Ubaid: ca. 2.4 ha (O3-1:1, O3-3:1); Jemdet Nasr-Early Dynastic? (stone bowl sherd, cores, and blades); Ur III-Early Larsa: 4.5 ha (RJ7-1:5, RJ7-3:2, RJ7-4:3, B7-1:1, B7-2:2, B7-3:1 with paint, B7-5:2, O7-1:1); Cassite: 4.5 ha (RJ8-3:2, RJ9-1:2, B9-1:2, O9-1:1).
- 97 — 80 NE × 70 × 1. Ubaid cultivation? (O3-1:1); Late Larsa?: 0.5 ha (RB6-1:1, RJ7-5:1, RJ8-1:1, RB8-3:1, B8-2:4); Cassite?: trace (RB9-1:1).
- 98 — 125 NW × 100 × 0.5. Bricks in looted tomb, 26 × 17 × 7.2 cm; ceramic slag. Terminal Ubaid: 1.0 ha (RJ3-1:1, RJ3-2:1, RB3-1:1, RB3-4:3, RB3-5:5, RB3-6:2, RB3-7:1, RB3-8:7, RB3-11:1, RB3-15:4, RB3-16:3, O3-1:10 [some fused together in manufacture], O3-2:8); Ur III-Early Larsa: looted tomb (B7-2:1, B7-3:1). (Perhaps Woolley's "Rejibah X," 1956.)
- 99 — 100 N × 50 × 0. Ceramic slag. Late Larsa: 0.5 ha (B7-3:1, RJ8-1:2, RJ8-3:1, RB8-1:1 with wavy line, RB8-4:1 with large groove, B10-2:1).
- 100 Eridu Jinub. 390 NW × 305 × 5. Bricks, 30.5 × 30.5 × 6 cm, 25 × 24 × 6 cm. Ur III-Early Larsa? (RJ7-3:1, B7-1:1, B7-3:1, B7-4:2); Late Larsa: ca. 5.0 ha (RJ8-1:3, RB8-1:1, RB8-4:3, B8-1:5, O8-1:4); Cassite-Post-Cassite: 9.5 ha (RJ9-2:1, RJ9-3:1, RB9-2:3, RB9-3:1, RB9-4:1, B9-1:4, B9-3:1, O9-1:1); Neo-Babylonian+: trace (RB10-5).
- 101 — 280 N × 155 × 2. Late Larsa: 2.5 ha (RJ8-1:5, RB8-2:1, RB8-5:3, B8-1:1?, O8-1:1), Neo-Babylonian+: trace (RJ10-1:1 without ridge, O10-3:1).
- 102 — 325 N × 300 × 2. Neo-Babylonian+: 8.5 ha (RJ10-1:5 [3 without ridge], RJ10-2:1, RB10-2:1, RB10-5:1, B10-4:1, O10-3:3, O10-4:1).
- 103 — 330 E × 280 × 2. Brick fragments; ceramic slag; mud-brick room block footings visible on summit. Late Larsa? (RJ7-5:3, B7-2:4, B7-3:1, B7-5:2, RJ8-3:5); Cassite: 6.4 ha (RJ9-1:1, RB9-1:1, RB9-2:2, RB9-3:5, B9-1:3, O9-1:1); Neo-Babylonian+: trace (RJ10-2:3).
- 104 — 235 NW × 165 × 3. Ceramic slag; possible stone footings; concentrations of freshwater bivalves. Eridu, Hajji Muhammad, Early Ubaid (RB2-1:2, RB2-4:1); Late and Terminal Ubaid: 3.1 ha (RJ3-2:3, RB3-6:5, RB3-8:3, RB3-9:1, RB3-10:2, RB3-11:4, RB3-13:1, RB3-15:1, O3-1:6, O3-2:8, O3-3:3); Uruk?: trace (crosshatch decorated jar shoulders: 2) (Probably Safar's 'Usaila; see Safar 1950, p. 28.)
- 105 — 180 N × 150 × 2. Large basalt pieces on summit. Terminal Ubaid (interior scraped sherd); Late Larsa: 2.2 ha (RJ7-5:1, B7-2:1, B7-6:1, RJ8-1:2, RJ8-2:1, RB8-4:1, B8-8:3, O8-1:3); Cassite: 2.2 ha (RB9-1:2, RB9-2:1, B9-1:2, B9-2:1, RB10-4:2 thick).
- 106 — 280 NE × 160 × 2. Bricks. Late Larsa: 2.4 ha (RJ8-1:10, RJ8-3:3, RB8-2:3, B8-1:1, O8-1:1, O8-2:1); Post-Cassite?: trace (RB9-1:2 [1 with hatched ridge], RB9-4:1).
- 107 — 110 WNW × 95 × 2. Post-Cassite: 0.8 ha (RJ7-5:1, B7-1:2, B7-2:4, B7-4:4, B8-3:3, B8-5:1, RJ9-1:1, RJ9-2:4, RJ9-3:1, RB9-1:1, RB9-2:5, RB9-4:1, B9-2:1, B9-3:1, RJ10-2:1).
- 108 — Eridu Jinub. 600 N × 500 × 5. Bricks, 33 × 32 × 7 cm, 32 × 31 × 7 cm, 25.5 × 25.5 × 8 cm; ceramic slag. Ur III-Early Larsa? (RJ7-3:1, B7-1:1, B7-4:1); Late Larsa: ca. 10 ha (RJ8-1:10, RB8-3:1, RB8-4:2, B8-1:1); Neo-Babylonian+: 22 ha (RJ10-1:7 [3 without ridge], RJ10-



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- 2:1, RB10-4:1 thick, B10-1:1, B10-2:1, O10-8:1, O10-9:1).
- 109 Ishan Khinaitla. 250 N × 230 × 0.5. Late Larsa: 3.8 ha (RB6-:1, RJ7-3:1, RJ7-5:8, RJ8-1:8, RB8-2:2, RB8-4:2 large, B8-2:2, O8-1:2); Neo-Babylonian+: 3.8 ha (RJ10-1:8 [5 without ridge], RJ10-2:4, RJ10-3:1, RB10-2:3, RB10-3:3, B10-1:4, B10-4:1, O10-3:3).
- 110 — 135 N × 120 × 0.5. Neo-Babylonian+: 1.3 ha (O6-1:1, RJ8-1:2, RJ10-1:14, [4 without ridge], RJ10-2:1, RJ10-3:1?, RB10-1:1, B10-1:5, O10-3:1, O10-5:1).
- 111 — 230 E × 110 × 0. Brick fragments. Terminal Ubaid+ (O3-1:1, interior combed sherds); Ur III–Early Larsa: 1.9 ha (RJ7-1:1, RJ7-2:1, RJ7-3:2, RJ7-4:2, RJ7-5:1, B7-5:8, B7-6:8, O7-1:1); Cassite: trace (RB9-1:1, RJ9-3:1, O9-1:1).
- 112 — 100 WNW × 50 × 1. Neo-Babylonian+: 0.4 ha (B7-1:1, RJ8-1:1, RJ10-1:9 [5 without band], B10-2:2, O10-8:1, O10-9:1).
- 113 — 110 NW × 80 × 0.5. Neo-Babylonian+: 0.7 ha (B7-1:1, RJ8-1:1, RJ10-1:6 [6 without ridge], RJ10-2:2, BJ10-2:1, BJ10-3:1, O10-7:1, O10-9:1).
- 114 — 70 NW × 50 × 1. Late Larsa: 0.3 ha (RJ7-5:2, RJ8-1:2, RB8-4:2, B8-1:2, O8-1:2); Neo-Babylonian+: trace (RB9-5:2 thin, B10-1:1).
- 115 — 250 NW × 110 × 1. Ceramic slag. Late Larsa? (RJ7-5:1, RJ8-1:1, RJ8-3:2, B8-3:1, O8-1:1); Neo-Babylonian+: 1.9 ha (RJ10-1:9 [2 without band], RJ10-2:1, RB10-2:3 [2 glazed], RB10-3:1 glazed, RB10-4:1 glazed, B10-2:1, B10-4:5, O10-4:1).
- 116 — 150 NW × 95 × 0.5. Very few sherds. Neo-Babylonian?: 1.3 ha (RB10-4:2).
- 117 — 180 E × 150 × 1. Neo-Babylonian+: 2.5 ha (RB6-1:4 glazed, B7-1:1, RB8-1:7 small, RB8-5:1, RB9-5:1, RJ10-1:11 [3 without ridge], RJ10-2:10, RJ10-5:1, RB10-2:2 glazed, RB9-5:1, B10-1:2, B10-2:2, O10-3:1, O10-4:2, O10-9:4).
- 118 — 165 × 80 × 1. Brick, 33 × 33 × 6.5 cm. Late Larsa: 1 ha (RJ8-1:3, RJ8-2:3, RB8-3:1, RB8-5:1, B8-1:1, B8-3:1, O8-1:1); Cassite–Post-Cassite?: trace (RB9-5:1 thin); Neo-Babylonian+: trace (RJ10-1:3, B10-2:2).
- 119 — 100 NW × 80 × 0.5. Neo-Babylonian+: 0.7 ha (B7-1:3:1, RJ10-1:2, RJ10-2:1, B10-4:1, O10-2:1, O10-4:1, O10-5:1).
- 120 — 145 NW × 115 × 1.5. Ceramic slag. Late Larsa: 1.3 ha (RJ8-1:3, RJ8-3:3, RB8-1:1, RB8-3:1, RB8-4:2, B8-1:3); Cassite–Post-Cassite?: trace (RB9-2); Neo-Babylonian+ (B10-2:1, B10-3:1).
- 121 — 60 × 60 × 0.5. Few sherds, none diagnostic.
- 122 east — 135 NW × 100 × 1.5. Akkadian: 1.2 ha (RJ6-2, RJ6-3 without ribbing, ribbed sherds); Ur III–Early Larsa: 1.2 ha (RJ7-1:4, RJ7-2:11, RJ7-3:2, B7-2:2, B7-4:5, B7-5:1); Cassite–Post-Cassite: trace (B9-3:2).
- 122 west Tell Daima. 470 NW × 225 × 3. Ur III–Early Larsa: 6.5 ha (RJ7-1:4, RJ7-3:3, RJ7-5:1, B7-1:1, B7-2:1, B7-5:12, B7-6:1, O7-1:3); Late Larsa?: trace (RJ8-1:3, RJ8-3:2); Post-Cassite: trace (RJ9-3:1, B9-1:1).
- 123–25 — Outside survey area.
- 126 — 140 N × 115 × 1. Many bricks and brick fragments, perhaps excavated by Woolley as a “suburb” of Ur. Few sherds.
- 127 — 220 W × 140 × 0.5. Early Ubaid (RB2-4); Late–Terminal Ubaid: 1.5 ha (RJ3-2:1, RB3-7:1, RB3-8:1, O3-1:5); Jemdet Nasr–Early Dynastic: 2.4 ha (RJ4-1:1, O4-1:1, O4-2:12, O4-4:1, RJ5-1:1, RJ5-2:7, RJ5-3:4, RJ5-4:1, RB5-1:7, RB5-2:3, RB5-3:1, RB5-6:2, B5-3:6, B5-4:6, O5-2:4, O5-3:2, O5-4:2, O5-7:1); Ur III–Early Larsa?: trace (RJ7-4:3, RB8-1:1, B7-5:1, O6-1:1).
- 128 — 180 NW × 170 × 1. Bricks, 35 × 33 × 7 cm; ceramic slag. Late Larsa? (RJ7-5:5, B7-1:1, B7-2:5, RB8-1:2); Cassite: 1.8 ha (RJ9-1:3, RB9-1:3, RB9-2:4, RB9-3:3, B9-1:2, O9-1:1).
- 129 — 65 × 65 × 0.5. Few sherds. Late Larsa: 0.3 ha.
- 130 — 60 × 60 × 0.5. Looted cemetery. Cassite–Post-Cassite (RJ7-5:1, B7-1:1, B7-2:1, B7-3:1, RJ8-1:1, B8-1:1, RJ9-1:1, RJ9-3:1, RB9-1:2, RB9-2:1, RB9-3:1, RB9-4:1, RB9-5:1, B9-3:3, RJ10-2:1).
- 131 — 150 N × 110 × 2. Bricks, 31 × 31 × 5.5 cm, 29 × 29 × 6 cm. Site on gravel ridge of Hazim. Cassite–Post-Cassite (RJ7-5:7, B7-1:1, RB8-1:1, RB8-3:2, RJ9-2:1, RB9-1:4, RB9-2:3, RB9-4:4, B9-1:2, B9-2:2, RJ10-2:4).
- 132 — 75 × 75 × 1. Also on Hazim. Few sherds.
- 133 — 260 N × 190 × 5. Also on Hazim. Ceramic slag; bricks, 30 × 29 × 6 cm, 30 × 30 × 8.5 cm. Early Dynastic? (RB5-2:3); Ur III–Early Larsa: 1 ha (RJ7-5:5, RJ7-3:1, B7-1:2, B7-3:1, O7-1:1); Late Larsa: 3 ha (RJ8-1:13, RJ8-2:3, RJ8-3:1, RB8-1:2, RB8-3:6, RB8-4:4, B8-1:1?, O8-1:8, O8-2:3); Post-Cassite: trace (RJ9-2:1, RB9-1:2); Neo-Babylonian+: trace (R10-1:4 without ridge, RJ10-4:1, B10-3:1).
- 134 — 110 E × 65 × 0.5. Many bricks, 26 × 26 × 6.5 cm, 31 × 26 × 7 cm, 32 × 30 × 8 cm, 35 × 34 × 7 cm. Planoconvex brick wall footings, 25 × 16 × 7.5 cm. On bank of channel through Hazim. Late Ubaid: (RB3-4:1, O3-1:1, O3-2:1); Jemdet Nasr–Early Dynastic: 0.3 ha (RJ4-2:1, RJ5-2:1, RJ5-4:2, RJ5-5:1, RB5-2:2, B5-2:1, O5-

# Appendix: The Southern Margins of Sumer

- 3:1); Akkadian? (RJ6-2?:1 ribbed sherd); Ur III–Early Larsa: 0.3 ha (RJ1-1:2 with very high collars, B7-1:1, B7-3:1, B7-6:1, B8-1:1, B9-3:1).
- 135 *south* — 100 NNE  $\times$  70  $\times$  0.5. Brick fragments. Late Larsa: 0.5 ha (RJ7-3:1, RJ7-5:1, B7-1:6, RJ8-1:9, RJ8-3:1, RB8-4:5 [4 very thick], B8-1:2, B8-2:3, O8-1:9, O8-2:2); Neo-Babylonian+: trace (RB9-3:1, RJ10-2:1, RJ10-4:1, B10-2:1).
- 135 *north* — 100 NNE  $\times$  70  $\times$  0.5. Remains of rectangular oven with six cylindrical side chambers. Neo-Babylonian+: 0.5 ha (RB6-1:3, RB8-5:1, B8-2:1, RJ10-1:5, RJ10-2:2, RB10-2:1, B10-1:4, O10-3:1, O10-4:3).
- 136 — 180  $\times$  180  $\times$  1. Bricks, 30  $\times$  29  $\times$  6 cm, 26.5  $\times$  26  $\times$  5.5 cm, 16  $\times$  9.5  $\times$  6 cm. Cassite: 2.2 ha (RJ7-5:2, B7-1:2, B7-2:4, RJ9-1:2, RB9-2:5, RB9-5:1, B9-1:3, O9-1:1).
- 137 — 115 N  $\times$  90  $\times$  1. Late Larsa (RJ8-1:2, RB8-4:1, O8-1:2).
- 138 — 160 NE  $\times$  125  $\times$  1.5. Bricks, 30  $\times$  30  $\times$  5.5 cm; ceramic slag in heaps to southeast. Cassite: 1.4 ha (RJ7-5:1, B7-1:1, B7-3:2, RJ9-1:1, RB9-2:4, B9-1:1, B9-2:1).
- 139 — 100 NNW  $\times$  90  $\times$  0.5. Post-Cassite?: 0.7 ha (RB8-1:1, RB8-3:1, RB9-2:4, RB9-4:1, RB9-5:1).
- 140 — 150 E  $\times$  140  $\times$  1.5. Late Larsa: 1.5 ha (RB6-1:3, RJ7-5:1, B7-1:1, RJ8-1:5, B8-1:2, B8-2:2); Neo-Babylonian+: 1.5 ha (RJ10-1:6 without ridge, B10-2:1, O10-3:1, O10-4:1, O10-5:1, O10-9:2).
- 141 Tell Rifa'i al-'Ubaid. 205 NE  $\times$  110  $\times$  1.5. Early Ubaid (RJ2-1:1, RB2-2:2, RB2-4:3); Late Ubaid: 1.5 ha (RJ3-1:2, RJ3-2:6, RJ3-3:1, RB3-2:3, RB3-3:3, RB3-5:4, RB3-6:2, RB3-7:1, RB3-8:6, RB3-9:2, RB3-11:2, O3-1:10, O3-2:2, O3-3:3, interior-combed sherds: 2); Uruk: 1 ha (RJ4-1:1, RJ4-2:3, RB4-1:7, O4-1:1, O4-2:3, O4-6:2, O4-7:1 of grayware, crosshatched shoulder decoration).
- 142 — 190 E  $\times$  65  $\times$  0. Ubaid cultivation (O3-1:2); Jemdet Nasr–Early Dynastic: 1.5 ha (RJ5-1:3, RJ5-2:2, RJ5-4:3, RB5-1:1, RB5-2:1, RB5-6:3, B5-1:1, B5-2:2, B5-3:3, B5-4:5, O5-2:2, O5-3:1, O5-7:3).
- 143 — 100 NW  $\times$  60  $\times$  1. Bricks. Late Larsa: 0.4 ha (RB5-2:1, B7-1:1, RJ8-1:3, RJ8-3:2, RB8-2:1, RB8-4:2, B8-1:3); Neo-Babylonian+: trace (RJ10-1:1).
- 144 — 105 N  $\times$  90  $\times$  0.5. Bricks, 29  $\times$  21  $\times$  7 cm. Late Larsa: 0.9 ha (RB5-2:2, RB6-1:2, B7-1:2, RJ8-1:3 [1 small], RB8-2:1, B8-1:2, O8-1:3, RJ10-1:1 without ridge).
- 145 — 220 N  $\times$  90  $\times$  1. Jemdet Nasr–Early Dynastic? (B5-4:1, O4-1:1); Ur III–Early Larsa: 1.2 ha (RJ7-2:1, RJ7-3:3, B7-1:1, B7-3:2 large, B7-5:3, RJ8-1:1, RJ8-3:4).
- 146 — Large holes in sandy soil, perhaps recent borrow pits; Late Larsa sherd scatter.
- 147 — 350 NNW  $\times$  210  $\times$  2. Brick fragments; ceramic slag. Cassite: 3.7 ha (RJ7-5:7, B7-1:3, B7-2:3, RJ8-3:1, RJ9-1:1, RB9-1:3, RB9-2:6, RB9-3:7, B9-1:2, O9-1:1).
- 148 Tell al-Dahaila. 550 WNW  $\times$  320  $\times$  7. Bricks, 37  $\times$  37  $\times$  6.5 cm, 33  $\times$  32.5  $\times$  7 cm; ceramic slag concentration on west extremity. Ubaid cultivation? (O3-1:1); Late Larsa? (B7-3:1, RJ8-1:1, RB8-5:1); Neo-Babylonian+: 15 ha (RB6-1:1, RJ10-1:1 [2 without ridge, 1 small], RJ10-2:4, RJ10-4:1, RJ10-5:1, RB10-1:1, RB10-4:1, RB10-5:2, B10-1:5, B10-2:4, O10-3:2, O10-4:2).
- 149 Tell al-Skena. 95 NW  $\times$  30  $\times$  1.5. Cassite: 0.4 ha (B7-1:3, B7-2:1, RJ9-1:1, RB9-3:1, RB9-5:1).
- 150–55 — Outside survey area.
- 156 — 200 NNW  $\times$  70  $\times$  0. Pieces of carved limestone and several limestone door sockets. Ubaid cultivation? (O3-1:2); Jemdet Nasr–Early Dynastic: 0.6 ha (O4-1:1, RJ5-1:7, RJ5-2:2, RJ5-4:1, RB5-3:1, RB5-6:9, B5-2:4, B5-3:7, O5-2:2, O5-3:1, O5-4:3, O5-5:1, O5-7:10, semicircular limestone slab with circular perforations) (see Woolley 1956, pl. 33).
- 157 — 225 N  $\times$  150  $\times$  3. Bricks, 25  $\times$  17.5  $\times$  7.5 cm. Ur III–Early Larsa: 2.2 ha (RJ7-1:1, RJ7-2:1, RJ7-3:1, RJ7-4:1, B7-1:3); Late Larsa (RJ8-1:14, RB8-3:5, RB8-4:1, RB8-5:2, B8-1:10, O8-1:4, O8-4:4, RB9-1:1); Neo-Babylonian+: trace (RB10-1:1).
- 158 — 425 NE  $\times$  290  $\times$  5. Bricks, 39  $\times$  39  $\times$  7 cm, 36  $\times$  35.5  $\times$  7 cm, 32  $\times$  32  $\times$  6 cm, 22.5  $\times$  22  $\times$  6 cm; ceramic slag to east and south; kilns or ovens to north. Late Larsa: 9.3 ha (B7-1:1, RJ8-1:3, RB8-4:1, RB8-5:2, O8-2:1); Cassite: trace (B9-1:1); Neo-Babylonian+: 9.3 ha many graves (RJ10-1:12 [3 without ridges], RJ10-2:4, B10-1:2, B10-4:2, O10-2:2, O10-3:1, O10-4:2).
- 159 — 260 NNW  $\times$  175  $\times$  2. Much slag; many graves; few sherds. Jemdet Nasr–Early Dynastic? (RJ5-1:1); Ur III–Early Larsa? (RB6-1:1, RJ7-2:1?, RJ7-5:1, B7-1:2); Late Larsa: 3.2 ha (RJ8-1:4, RJ8-3:2, B8-1:4, O8-1:2); Neo-Babylonian+: trace (RB9-2:2, B9-3:2, RJ10-1:2 without ridge, B10-2:1).
- 160 — 150 NW  $\times$  140  $\times$  1.5. Ceramic slag. Late Larsa: 1.3 ha (B7-1:4, RJ8-1:3, RB8-1:1, RB8-3:2, RB8-5:3, B8-1:2); Post-Cassite: 1.3 ha (RJ9-1:1, RJ9-3:1, RB9-2:3, B9-2:1).
- 161 — 250 W  $\times$  200  $\times$  2.5. Much damage by wind erosion. Bricks, 34.5  $\times$  34.5  $\times$  5 cm; brick and mud-brick footings visible. Ubaid cultivation?

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- (O3-1:1); Ur III–Early Larsa: 2.5 ha (RJ7-1:4, RJ7-3:5, RJ7-4:1, RJ7-5:2, B7-1:2, B7-3:9, B7-5:5, O7-1:3); Late Larsa?: trace (O8-1:3, RJ8-3:2).
- 162 — 125 WNW  $\times$  90  $\times$  1. Clear small canals and plow marks to west of site. Ubaid cultivation? (O3-1:1); Neo-Babylonian +: 0.9 ha (RB6-1:1, RB8-2:1, RJ10-1:9, RJ10-2:6, RJ10-3:1, RJ10-4:1, RB10-3:1, RB10-4:2, RB10-5:1, B10-1:1, B10-4:2, O10-2:1, O10-3:1, O10-4:2).
- 163 — See map, figure 26. 155 N  $\times$  150  $\times$  1. Bricks, 33  $\times$  33  $\times$  5 cm, 31.5  $\times$  31.5  $\times$  5 cm. Traces of rectangular wall, 130 m square, with bastions. Jemdet Nasr–Early Dynastic?: trace (RB5-2:1); Late Larsa: 1.8 ha (RJ8-1:8, RJ8-2:1, RJ8-3:1, RB8-3:2, RB8-4:2, RB8-5:1 thick, B8-1:4, O8-1:4); Neo-Babylonian +: 1.8 ha (B9-3:1, RJ10-1:4, RJ10-3:1, B10-2:4, O10-3).
- 164 — 250 WNW  $\times$  80  $\times$  3. Ceramic slag. Cassite–Post-Cassite: 1.4 ha (B7-1:4, B7-2:4, RJ7-5:3, RB8-1:1, O8-1:1, RJ9-2:1, RB9-2:2, RB9-4:1, RB9-5:3, B9-1:2).
- 165 — 180 NW  $\times$  140  $\times$  1. Ubaid cultivation? (O3-1:1); Late Larsa? (RB6-1:1, RJ7-5:2, RB8-1:1, O8-1:1); Neo-Babylonian +: 1.9 ha (RJ10-1:6, RJ10-2:4, RJ10-3:1, RJ10-4:1, O10-4:3, O10-5:1).
- 166 — 35  $\times$  35  $\times$  1.5. Traces of rectangular wall 35 m square. Late Larsa: 0.2 ha (B7-3:1, RJ8-1:5, RJ8-3:1, RB8-1:1, RB8-2:1, RB8-4:1, RB8-5:2, B8-1:4, O8-2:1).
- 167 — Small slag concentration ca. 2 m high. Neo-Babylonian +.
- 168 — Number not assigned.
- 169 — 200  $\times$  200  $\times$  1. Many looted graves. Late Larsa: 1.9 ha (RJ8-1:2, RB8-4:1, B8-2:1, O8-1:1); Neo-Babylonian +: 1.9 ha (RJ10-1:7 without ridges, B10-4:2, O10-3:1).
- 170 — 210  $\times$  210  $\times$  1. Post-Cassite: 3.6 ha (B7-1:2, B7-2:2, RJ8-3:1, RJ9-3:1, RB9-1:2, RB9-2:1).
- 171 — 350 NE  $\times$  240  $\times$  1. Uruk: 4.2 ha (RJ4-1:11, RJ4-2:3, RB4-1:3, O4-1:1, O4-2:4, O4-3:3, O4-5:2, O4-8:1); Late Larsa: trace (RB8-2:1); Cassite–Post Cassite: trace (RB9-3:1).
- 172 Tell al-Lahm. 390  $\times$  310  $\times$  13. Air photograph shows town wall. Early Dynastic: ca. 5 ha; Akkadian: ca. 5 ha; Ur III–Early Larsa: ca 8 ha; Late Larsa: ca. 8 ha; Cassite–Post-Cassite: ca 11 ha (see Safar 1950).
- 173 Tell al-Lahm Shamal. 430 N  $\times$  410  $\times$  2. Post-Cassite, Neo-Babylonian +: 14 ha (see Safar 1950).
- 174 — 55 N  $\times$  45  $\times$  0. Looted graves. Ur III–Larsa? (RJ7-5:3, B7-1:1, B7-5:1, RJ8-3:1); Cassite–Post-Cassite (RJ9-1:1, RJ9-2:1, RJ9-3:3, RB9-1:1, RB9-2:2, B9-1:1).
- 175 Tell al-Awaija or Maftul Shaykh Ajil. 250 N  $\times$  150  $\times$  2.5. Jemdet Nasr–Early Dynastic: 2.7 ha (RJ5-2:2, RB5-2:4, B5-1:3, B5-2:1, B5-4:5, O5-2:2, O5-4:3, O5-4:1, cylindrical cup bases: 2).
- 176 — 135 NE  $\times$  115  $\times$  0.5. Much salt damage. Jemdet Nasr–Early Dynastic: 1.1 ha (RJ5-2:1, RB5-1?:1, RB5-2:7, B5-1:1, B5-2:1, B5-3:2, B5-4:3, O5-2:1).
- 177–79 — Outside survey area.
- 180 — 90  $\times$  60  $\times$  0.5. Late Larsa: 0.6 ha (RJ7-3:1, B7-1:2, RJ8-1:2, O8-1:2).
- 181 — Outside survey area.
- 182 West — 250 E  $\times$  210  $\times$  2. Ur III–Early Larsa? (RJ7-5:2, B7-1:4, B7-2:2, B7-3:2); Late Larsa: 3.0 ha (RJ8-1:3, RB8-3:3, O8-1:1, O8-2:2); Cassite: 3.0 ha (RJ9-1:3, RB9-1:1, RB9-3:2, RB9-5:1, B9-1:3 small).
- 182 East — 330 E  $\times$  150  $\times$  2. Neo-Babylonian +: 3.7 ha (RJ8-1:2 small, RJ10-1:21 [14 without band], RJ10-2:2, RB10-1:2, RB10-2:7, RB10-3:2, RB10-4:3, B10-1:2, O10-4:3).
- 183 Merejib. 430 NW  $\times$  250  $\times$  3. Early Larsa (RJ7-3:1, RJ7-5:5, B7-1:1, B7-2:3, B7-5:1); Late Larsa? (RJ8-1:3, RB8-1:1); Cassite: 7.2 ha (RJ9-3:1, RB9-1:6, RB9-2:2, RB9-4:1, RB9-5:1, B9-1:2, B10-4:1). (Not Woolley's Merejib; see EP 29; see also Campbell-Thompson 1919.)
- 184 — 95  $\times$  95  $\times$  0.5. Few sherds. Neo-Babylonian +.
- 185 — 80  $\times$  80  $\times$  0.5. Ubaid cultivation? (O3-1:1); Ur III–Early Larsa: 0.5 ha (RJ7-3:3, RJ7-5:2, B7-1:1, B7-5:3, B7-6:2); Late Larsa? (RJ8-1:2, RB8-1:2, RB8-3:1); Cassite: 0.5 ha (RB9-1:1, RB9-2:1, B9-1:1).
- 186 — 45  $\times$  45  $\times$  0.3. Cassite: 0.2 ha (RJ7-5:2, B7-1:5, B8-1:1, RB9-1:3, RB9-2:3, RB9-5:1, B9-1:2).
- 187 Tell Tuwayil. 180 WNW  $\times$  110  $\times$  3. Ubaid cultivation? (O3-1:1); Late Larsa? (B7-1:1, B7-2:3, RJ8-1:4, RB8-1:1); Cassite: 1.5 ha (RB9-2:2, RB9-3:2, B9-1:4).
- 188 — 150  $\times$  150  $\times$  1. Cassite–Post-Cassite: 1.9 ha (RJ7-5:2, B7-1:4, B7-2:4, B7-3:1, RJ8-1:1, RJ9-2:1, RB9-1:9, RB9-2:3, RB9-3:2, RB9-5:3, B9-1:4, O9-1:2).
- 189 — 180  $\times$  180  $\times$  0.5. Ur III–Larsa? (RJ7-5:5, B7-1:1, B7-4:1, RB8-3:1, RB8-5:1); Cassite–Post-Cassite: 2.1 ha (RJ9-2:3, RJ9-3:2, RB9-2:1, RB9-4:4, B9-1:1, B9-3:1, RJ10-2:1).
- 190 — 170 E  $\times$  90  $\times$  3. Late Larsa? (RJ7-5:6, B7-1:1, B7-2:1, RJ8-1:2, RB8-1:2, RB8-3:1); Cassite–Post-Cassite: 1.7 ha (RJ9-1:1, RB9-1:1, RB9-2:4, RB9-4:2).



# Notes

## CHAPTER 1

1. The estimate that losses amount to about half of consumption requirements, or about one-third of gross diversion, may be much too low. This is a widely repeated rule of thumb in Middle Eastern agricultural planning studies, but such studies are not noted for the care with which they measure features of the traditional agricultural regime they are seeking to replace. A recent, much more systematic and anthropologically oriented study of the utilization of water under similar conditions in southwestern Iran comes to the radically different estimate that there are "very high (up to 60%) losses from primitive canals during conveyance to the fields" (Kirkby 1977, p. 271). If something approaching three-fifths instead of one-third of gross diversions was normally lost, the calculations on maximum extent of irrigable area that are offered below may need to be reduced by almost half.

2. These general remarks fail to take into account certain minor cultivation practices that did not coincide with the primary agricultural cycle. Intensive summer cultivation of fruits and vegetables on very restricted plots was obviously one category with a different schedule. But in addition Landsberger has called attention to a fast-growing two-row barley (*Hordeum nigrum rectum*) that could be planted as late as mid-March, when water supplies were ample, and be ready for harvest by early June. In the abstract, a cereal with these qualities seems to have been of great potential importance as a means of enlarging and assuring agricultural output. Inexplicably, however, that was not the case: "diese Art von Sommer-saat kann, da in Formularen und Wirtschaftsurkunden nicht zu belegen, stets nur untergeordnete Bedeutung gehabt haben. Schliesslich scheint sie (seit der Kassitenzeit?) ungebrauchlich geworden und in Vergessenheit geraten zu sein" (Landsberger 1949, pp. 283-84).

3. Two factors generally permit irrigation deposits to be distinguished from natural sedimentation: (1) uniform canal gradients lead to constant, relatively high velocity of flow, so that bed deposits are more uniformly made up of coarser soil particles than in the case of natural streams; and (2) with an

abrupt inflow into relatively small irrigation basins, sedimentation in the fields is relatively more undifferentiated (Schilstra 1962, p. 188).

4. M. G. Ionides (1954, p. 394) makes the same point in arguing that the Lees and Falcon estimate of 1,500 square miles should be corrected to "more like ten times that on which the authors have based their calculations," or about 38,400 square kilometers. The further increase in the estimate made here stems largely from archaeological surveys in intervening years, attesting to periodic shifts in the Tigris and Euphrates courses and the branching character of the ancient Euphrates in particular. This allows for even greater dispersal of the silt load than Ionides could have been aware of.

5. This statement finds some confirmation at Tell Abu Salabikh, within the intensively surveyed area. The excavators' reports and sections indicate that virgin soil underlying an Early Dynastic occupation of the eastern part of the mound was encountered at depths of between 1 and 2 meters below the level of the surrounding plain (Postgate and Moorey 1976, pp. 135, 141, fig. 5).

6. As Butzer summarizes present evidence for these changes, there were "higher world sea levels of +2 m or more ca. 1200 B.C., as well as lower sea levels of -2 m or so ca. 2200 B.C. and again 300 B.C." (1976, p. 36; cf. Nützel 1975).

7. Roux 1960. To judge from the appearance of the surface pottery, Abu Salabikh goes back certainly to Neo-Babylonian times and Tell Aqram may date in part to the Cassite period. Nothing in the illustrations appears older.

8. Working with air photographs that I have been unable to examine, Buringh (1960, fig. 65) has traced well-defined meander patterns at the upper end of the Shatt al-Hilla that surely must be those of a major ancient branch of the Euphrates.

9. The original map appears to have been based on compass bearings and on distances estimated from travel times. The latter are fairly irregular and are especially foreshortened toward the east. In revising it, stream courses and ancient site and recent settlement locations were corrected where possible

from the air photographs, and other contemporary settlements and land-use boundaries were then entered by extrapolation.

10. No attempt has been made in the revised map to preserve Andrae's distinction between *qal'as* and *muftuls* that were in ruins and those that were still in use. This does not seem informative as to the contemporaneous distribution of settlements, since the map was made during the later stages of a process of general abandonment. It also may be worth nothing that recent pottery was observed at a substantial number of sites where Andrae fails to record a present or former settlement (e.g., sites 003, 007, 010, 011, 026, 027, 028, 029, 042, 043, 047, 050, 052, 1357, 1358, 1396, 1407, 1452, and 1457), even though no systematic attempt was made to record all recent sites. This seems to argue that many of them had been abandoned much earlier, so that they easily escaped his notice and were no longer known to his informants. If so, the "Recent" settlement pattern may be one of considerable antiquity.

11. The original map from which figure 5 has been adapted was drawn up by Major Ali Bey, of the staff of the Imperial War College, who had accompanied General Ragib Aga to Baghdad on the latter's special assignment from the sultan. It was reproduced at the Imperial Army Engineering School in A.H. 1264 (A.D. 1847–48). I am much indebted to my colleague Professor Richard L. Chambers for translating the legend and relevant geographical terms.

## CHAPTER 2

1. Several instances are discussed in later chapters in which this double counting is particularly likely to have occurred, including the rapid growth of Uruk toward the end of the Early Dynastic I period and the succession of the Ur III, Isin, and Larsa dynasties (see pp. 84, 143).

2. It is partly these considerations that have led to grouping together the settlement data for the Ur III and Isin-Larsa periods and for the Neo-Babylonian and Achaemenian periods in the chapters that follow, since their combined lengths more nearly meet the prevailing standard for other periods. But in both instances it would have advanced our understanding of economic and demographic processes if the separation between them could have been maintained, and the decisive reason for not doing so arose from the lack of clear criteria for separating the surface collections. Were a principle of standardization to be introduced into this study, its primary effect would probably be a still further reduction in the already very low population levels that are attributed to the Middle Babylonian period.

## CHAPTER 3

1. It will be noted that a form of nearest-neighbor analysis was employed in the original study of the Warka region (Adams and Nissen 1972, p. 27). The attempt is not being repeated for the reasons given.

2. The original date of  $2815 \pm 85$  B.C. was published without reference to the half-life on which it was based (Lenzen 1965, p. 20). The corrected date given here assumes that the Heidelberg laboratory was still employing the 5,570 half-life. If the 5,730 half-life that now has been generally adopted was

already being used, the figure of 3610 B.C. should be reduced to 3545–3295 B.C. The bristlecone dendrochronological correction is derived from Ralph, Michael, and Han 1973.

3. Postgate has recently summarized the evidence for the location of ancient Larak, perhaps somewhat audaciously drawing together slender textual leads as to where it was located and how it might be recognized. He concludes that it should be placed "on the eastern side of Sumer, to the north of Umma," and that the written evidence "rather indicates an almost total abandonment of the site from the Early Dynastic period (at the latest) until the 1st millennium. . . . We should look either for a large mound with a major occupation no later than ED III, overlaid by Neo-Babylonian remains, or else for two mounds of the two separate periods in the same vicinity" (1976, p. 82).

It should be noted that this extraordinary site exactly matches the prescription he has provided entirely independently. To be sure, the Neo-Babylonian resettlement at site 1306 was on a fairly limited scale. If Larak at that time was a place of some importance, as mention in the Murashu archive perhaps implies, one might speculate that little more than a shrine was erected on the ancient ruins while the name was transferred to nearby site 1439, a major, newly founded Neo-Babylonian town.

Postgate also notes that the first millennium references speak of Larak as having been "on the bank of the old Tigris." Is this possibly a reference to the very large watercourse dealt with earlier that was already abandoned in the fourth millennium? If this is Larak—and I do not wish to minimize the many uncertain links in the chain of reasoning leading to the identification—the site's attainment of greatest size as early as the Uruk period is of striking importance. It would seem to imply historicity for even the "antediluvian" portions of the Sumerian Kinglist and thus to bring the Uruk period itself tantalizingly close to the threshold of "history."

4. There are only two exceptions to this pattern, the pairing of 790 with 792 and of 1165 with 1166. It may be noted in table 7 of Appendix A to this chapter, however, that the surface collection from 790 was significantly later than the one from 792, and that 1165 similarly may well be later than 1166. In both cases, therefore, we may be dealing with a single relocated town rather than adjoining, coexisting ones.

5. Leaving aside chronological and locus-of-discard uncertainties, the frequency of recovery also seems to differ suggestively from district to district. Of particular interest is the contrastive distribution of clay sickle fragments and chert or flint blade segments that also may have been used in sickles, since this may reflect differing degrees of access to flint as a raw material. Henry Wright (pers. comm.) analyzes this contrast as follows:

"An indication of differing technological contexts within Middle-to-Late Uruk Mesopotamia can be gained by comparing the densities of clay sickle fragments and chert blade segments in ten-square-meter diagnostic surface collection units. The following figures suggest that clay sickles were more common and flint blades less common on the central Euphrates floodplain (Nippur-Warka subregion) than on the southern margins of Sumer (Ur-Eridu subregion) during this span of time:

	<i>Nippur-Warka</i>		<i>Ur-Eridu</i>	
	Mean No./ 10 m <sup>2</sup>	Standard Deviation	Mean No./ 10 m <sup>2</sup>	Standard Deviation
Clay sickle density	2.72	2.99	1.85	.64
Flint blade density	.26	.25	1.85	1.69
Number of collections	27		3	

“Striking as this apparent difference is, however, it must be regarded as still doubtful. The large standard deviations are indicative of markedly skewed distributions. Testing with the Kruskal-Wallis nonparametric one-way analysis of variance, a test appropriate to such nonnormal statistical distributions, shows that the probability of the observed difference in clay sickle density being due to chance is .91 while that for flint blades is .27. With more samples from the Ur-Eridu subregion a significant difference could probably be demonstrated. But only when small-scale excavations have been undertaken in a sample of Uruk sites in the two subregions will it be possible to eliminate the possibility that such differences are a result of different erosion processes in various parts of the alluvium.”

6. Adams and Nissen (1972, p. 29). Note that the dimensions ordinarily recorded in the Warka survey as well as this one specify, in effect, the minimum size of the rectangles enclosing sites rather than the area of the ordinarily circular or ovoid sites themselves. Hence areas as given in hectares throughout this study need to be reduced by roughly 20 percent to indicate hectares of actual settlement, although individual cases will vary considerably according to the regularity of their site perimeters. Within existing time constraints it was not possible to further refine site descriptions and areas on the basis of more numerous measured points along their perimeters, advantageous as this would have been on other grounds. In any case, refinement in this respect alone would do little to reduce the prevailing crudity of population estimates like these. Unavoidable as it is at present, the use of a uniform density standard like 125 persons per hectare introduces far larger uncertainties than those deriving from imprecisely measured areas. Subsumed within any average figure there is very likely to be considerable variation attributable to settlement size, function, duration, political/military circumstances, and other factors that could be specified only on the basis of substantial archaeological and/or textual evidence.

It is an underlying premise of this study—and indeed, of any synthetic reconstruction—that the existence of variability does not negate the careful use of averages in arriving at generalizations. On this basis surface data, even in the absence of (hitherto unrealizable) large archaeological exposures or extensive, systematic sampling, or both, does seem to justify tentative statements about aggregate regional population levels to which many different kinds of settlements would contribute. But estimates of the population of individual sites on the basis of surface data alone, through the use of a single density constant, must be regarded as little more than speculative. Cf. chap. 4, n. 1.

7. It is interesting that the hierarchy of urban size, and presumably political and economic dominance to some degree, bears no apparent relation to the conceptual categories of the time. Repeatedly copied geographical lists of Jemdet Nasr date

follow the order: Ur, Nippur, Larsa, Uruk, Kesh, Zabalam. . . . One would certainly think it was “reasonable to assume that a geographical list would be headed by the most important Sumerian cities” (Green 1977, p. 294). But the first three entries were unquestionably not comparable to Uruk in size during either Uruk or Jemdet Nasr times, not to speak of the Early Dynastic I period. At Larsa, in fact, we were unable to find surface material antedating the Early Dynastic I period, although admittedly the site was given only a fairly cursory and unsystematic inspection. The listing also follows no perceptible order based on geographical principles.

8. Following Postgate (1978, p. 73), the Sumerian sila (Akkadian *qa*) can now be estimated with reasonable certainty as 0.8 liters, on the basis of the directly measured volume of an inscribed jar. Allowing for slight expansion or contraction of the measuring medium, Postgate suggests a range of from 0.79 to 0.82 liters around his calculated volume of 0.80687 liters. Jacobsen’s published figures were on the basis of an assumed volumetric equivalence, 1 sila = 1 liter, and have been converted to the new standard by multiplying by a coefficient of 0.8. The same applies to later references to Jacobsen (1958). Other authorities have frequently used an equivalence of 0.842 liters, and their figures too have been adjusted on the new basis.

9. I am much indebted to Dr. Robert G. Hassert, of the staff of the University of Chicago’s Computation Center, for designing this program. He has made available a brief technical description of its algorithm, since there may be wider interest in its application (see pp. 127–29). No attempt was made to apply it to the Jemdet Nasr period data, incidentally, because of ambiguities as to site size that are outlined at the beginning of this section.

10. Nützel 1976, p. 23. There are substantial difficulties in generalizing from the limited data yet available to the rather sweeping conclusions of this article, and a number of its meteorological and statistical premises are highly questionable. But the evidence does point toward climatic trends of the kind the author describes, even if the magnitude of the effect of those trends on Mesopotamian irrigation agriculture must for the present be left quite uncertain.

11. Frequencies in Khuzestan apparently follow a somewhat different curve of development. On the basis of sherd densities in separate excavated samples from two sites, it has recently been suggested that in that region beveled-rim bowls reached a slightly earlier peak of popularity and then began to decline. Specifically, the recorded proportions of beveled-rim bowl sherds were 5 percent in Early Uruk, 56 percent in Middle Uruk, and 39 percent in Late Uruk (Johnson 1980, table 1). But it may be premature to speak of regional contrasts until the possibility of site-to-site variance within each region can be better evaluated on the basis of more numerous excavated samples.

#### CHAPTER 4

1. An increasingly voluminous body of data on Middle Eastern settlement density now is becoming available (Kramer 1980, tables 2 and 3). However, the discussion of ancient town size and population density continues to be based essentially on calculations from contemporary communities where large

distortions in traditional patterns may have been introduced by massive improvements in public health, transport, and so forth. Some statistics on Mesopotamian towns during World War I may therefore be of interest, in spite of their admitted imprecision. The population estimates given below are from the British Mesopotamian Expeditionary Force intelligence handbook (Admiralty War Staff, Intelligence Division 1917, vols. 2 and 3), while town areas have been calculated from a variety of large scale (1", 3", and 6" to the mile) maps drawn up contemporaneously by the MEF Survey Party:

<i>Locality</i>	<i>Size in Hectares</i>	<i>Population</i>	<i>Persons per Hectare</i>
Baghdad	372	"about 200,000"	538
Najaf	62.3	"over 30,000"	482
Hilla	68.7	"(1908) about 30,000"	437
Karbala	129	"perhaps about 50,000 (exclusive of a large floating population)"	388
Ba'quba	20.6	"4,000-5,000"	218
Diwaniya	19.3	"4,000 (1908), but then decreasing" (less than)	207
Kadhimayn	42.3	"about 8,000"	189
Nasiriya	54.6	"10,000 (?)"	183
Tawayrij	27.3	"about 4,000 (1908)"	147
Hai	32.9	"(1908) 4,000"	122
Shinafiya	30.7	"(1908) 3,500"	114
Kufa	28.9	"(1908) . . . about 3,000"	104
Qal'at al-Sikar	14.5	"(1908) about 1,000"	69
Rumaytha	38.1	"(1908) 2,500"	66
Samarra	36.1	"2,000 (?)"	55

Most of the figures recorded above for the smaller and medium-sized towns accord well with those for more recent settlements. Together with accumulating data on other regions in contemporary Iraq and Iran, they support the conclusion that "the figure for rural settlements' density is in most cases well below 200 persons per hectare" (Kramer 1980; cf. Alden 1979, p. 68). But the four largest towns in the series (which are ranked in order of decreasing density) form a striking exception at the head of the list. Indeed, they closely approximate the density just suggested for Old Babylonian living quarters, without regard for the other types of urban space utilization that we have assumed in most cases accompanied the latter. Is this assumption therefore to be discounted, or were there special considerations explaining the apparently high density of these particular four towns? Their role in connection with the Shi'ite pilgrim traffic might be one example of such a consideration, save that the same should then apply also to Kadhimayn. Another might have been the disproportionate use of baked brick, and hence of multistory residential construction. But, as with most of the more recent data, the real effect of these figures is merely to underscore the still unexplained variability in settlement density that makes the reckoning of ancient population levels so hazardous (cf. chap. 3, n. 6).

2. Professor Gelb (pers. comm.) has indicated some doubt whether Drehem or Umma was the source from which this tablet was obtained.

3. J. W. Turner, currently writing a dissertation at Yale University on Ur III agriculture at Umma, indicates (pers. comm.)

that yields there were sometimes fixed at 30 and sometimes at 34 gur per bur. Also newly interpreting some Umma records as accounts of sowing rather than of harvest, he believes that a slight upward adjustment in this estimate of productivity may be necessary.

4. I am indebted to J. W. Turner for suggesting this possibility.

5. I am informed by J. W. Turner (pers. comm.) that, at least in Umma, domestic animal diets also were supplemented with large-scale cuttings of reeds.

6. The dependence of tribal consolidation and fragmentation upon state policy is vividly portrayed in the official report of a British officer, writing in 1923 from his station in what had been southernmost Babylonia: "The period of absence of Government in the area had resulted in rapid tribal disintegration. Every lilliputian leader who could raise three or four followers refused to obey his shaikh and struck out on his own. This state of affairs is inconvenient for Government, and now a certain number of shaikhs are being recognized officially. Such men as these will be great gainers by the re-establishment of control by Government, which means that of themselves over their tribes also. Shaikhs will always, for the edification of their followers, raise loud lamentations over the question of taxes. Actually . . . they are the gainers by them. Of all the taxes they collect for Government they retain a share for themselves. Consequently the more Government is known to be pressing for taxes, the more the shaikhs can squeeze out of the cultivators and the more they get for themselves. It was very noticeable that as soon as tax-collecting began in Samawa all the shaikhs blossomed out in new clothes" (J. B. Glubb to Air Headquarters, quoted in Sluglett 1976, pp. 244-45).

## CHAPTER 5

1. It should not be forgotten that the city (or merely town?) of Opis, its ruins still unidentified, probably lay somewhere within the lower Diyala region along the left bank of the Tigris.

2. Almost a third of category 3 consists of sites that could not be directly investigated because of long-continuing later occupations. Hence their assignment to this size category is only provisional, and some of them may even have been abandoned for a time during the Sasanian-Islamic transition.

3. The question must also be left open for the present of how water was supplied to this system. The bed of the modern Tigris at this point is too low to permit a gravity-fed offtake on the suggested alignment, but it is of course uncertain whether this was the case in the first millennium B.C. By Neo-Babylonian times the pulley was in use in connection with animal-operated lifting devices (Laessøe 1953, pp. 5-26), but even so the apparent scale of the new canal seems to exceed what could reasonably be attempted with ancient lifting technology.

4. Traditional medieval manuscript representations of Iraq are "cognitive maps" that beautifully illustrate the ultimate consequence of the shift. The Tigris forms a straight ribbon lined with named towns so numerous that they are almost adjacent to one another, down the middle of a circular field. On the other hand, the Euphrates had by then been reduced in importance to a series of enclosed loops, with only a handful of named towns, in the upper left quadrant (Miller 1927, Bd. 3: Taf. 16).



5. The Nahr al-Malik (Akkadian *nar šarri*, Aramaic *nar malkha*) is a source of some confusion. Meaning simply “royal canal,” the name could be—and was—applied repeatedly to different watercourses. In Neo-Babylonian times, for example, a canal by that name extended into the interior of Uruk (Cocquerillat 1968, p. 16). Hence the mere presence of the term cannot be taken as an indication of an antecedent of the canal that later entered the Tigris below Seleucia already in the third millennium (cf. Barnett 1963, p. 13). Comparable confusion attends the widespread Iraqi Arabic use of the designation Nil (Nile) for the remains of a major watercourse. In all probability what was once the “royal canal” at Uruk is the levee now known locally as the Shatt al-Nil.

6. While confirming this identification of Weh Ardashir, the excavators note that their work has been limited to the western perimeter of the city, just inside the walls. Hence the ruins of Ctesiphon may still be found under a portion of Weh Ardashir nearer the west bank of the present course, or under the adjoining east bank.

7. The tax rate on dates provides a currently insoluble problem. Cf. below, p. 217, where it is argued that implied Early Islamic orchard densities are unrealistically low, by reference to earlier as well as later practices. Yet the general intent of the new Islamic rate schedules was to increase revenues sharply. If the spacing between palms in Sasanian times really was anything approaching as large as that implied for Early Islamic times, there is no way that even half as much of the *kharaj* revenue credited to Qubadh could have been collected. Morony, grappling with this problem from a different standpoint, raises the possibility that reputed Sasanian tax receipts from the Sawad may have been drawn instead from the entire Sasanian quarter of the west. As he goes on to point out, however, that latter administrative entity appears to have been first introduced by Qubadh's successor, Khusrau Anosharwan (Morony, n.d., chap. 1, sect. 2).

8. It is tempting to think of the unlocated remains of Amghishaya, destroyed by Khalid ibn al-Walid, said to have been the largest city of the Sawad (Tabari I, 2036–37; Yaqut I, 363).

But cf. Musil's discussion (1927, pp. 293–94), which more plausibly locates it on the Euphrates southeast of Hira, well to the west of the intensively surveyed region.

9. The failure to find much trace of Sasanian occupation in the part of this region that was archaeologically surveyed is at least partly to be explained by the after-effects of a fairly dense nineteenth century occupation there. It has been suggested that the Sasanian effort was of strictly limited duration. Hence, as noted earlier, sites would generally have been low and easily submerged by recent alluviation in a region where there has been no subsequent deflation of the land surface by the wind. The nineteenth century canal pattern, incidentally, is an irregular, opportunistic one that is easily distinguishable from the underlying early pattern. The fine detail of field canals that were part of it can be seen on the base map to form patches around the ancient site of Isin.

10. I am indebted to Fuad Safar (pers. comm.) for this reconstruction. He reports having visited the Shatt al-Kar region near here in the late thirties and being told by local inhabitants of an extractive activity they had followed, for export to German chemical firms, until the eve of World War I. It involved a plant locally called *shinaf*, probably the same as that elsewhere called *shinan*: “Various lahophytic *Chenopodiaceae* which are grazed by camels in summer and used by the people as a source of alkali (in making a crude soap for washing clothes) much as ‘barilla’ used to be made by the people in India, e.g. *Haloxylon*, *Arthrocnemum*, etc.” (Guest 1933, p. 92). Safar was told that the extractive procedure involved burning, boiling of the ashes, and then concentration through boiling of a solution made from them until only a thick cake of residue was left.

## CHAPTER 6

1. A few paragraphs in this chapter either recapitulate or summarize parts of another, quite differently oriented paper that necessarily covered some of the same ground (Adams, n.d.).



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